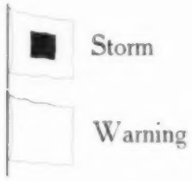
TELEPHONE ENGINEER

Vol. V CHICAGO, FEBRUARY, 1911 No. 2

Weather Prediction

Washington, D. C.



About this time expect sleet in large bunches.

Telephone and Telegraph service will be discontinued for a while, but subscribers (and others) will supply heat in quantities to melt all the ice to the North Pole. For why? Because, while copper is "the only material which gives conductivity," it breaks under sleet.

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Metal parts mounted on a heavy hard rubber top.

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Physical Laboratory Apparatus
Resistance Boxes and Wheatstone Bridges
Standard Weights and Measures

MADE BY

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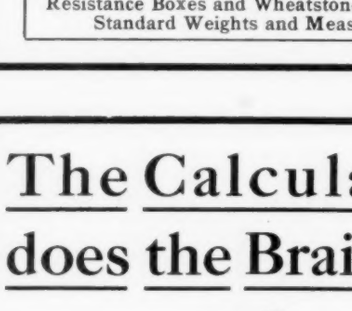
LICENSEES

The Calculagraph does the Brain Work



It subtracts the time a toll line is connected from the time conversation ceases and prints the difference—the **elapsed time** of the use of the circuit. The record is made in minutes and fractions of a minute.

The operator is thus left free to attend to other duties of operating and all **excess minutes** used are accounted for.

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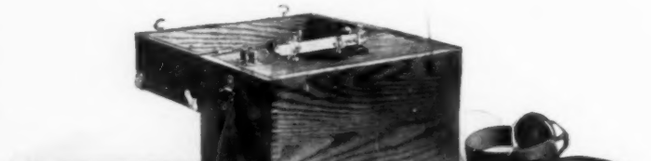

MATTHEWS' TELAFAULT

Louisville, Ky., Dec. 24, 1910.

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Referring to your letter of Dec. 22, with reference to the Matthews' Telafault, which was shipped us August 4th, will beg to say we have tested out this instrument and find that it works perfectly satisfactorily. It gives us a great deal better service than any other wireless tester we have tried, for the reason that all the others, when operating on cable which is in trouble, interferes seriously with the service. We find that Matthews' Telafault does not interfere at all with the service of the telephones which are not entirely out when testing. Of course this is a great advantage.

Yours very truly,
CENTRAL HOME TEL. & TEL. CO.
(Signed) by L. C. Griffitts, Engineer

W. N. MATTHEWS & BRO.

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Telephone Engineer

WITH WHICH IS CONSOLIDATED THE WESTERN TELEPHONE JOURNAL
ESTABLISHED 1902

VOL. V | CHICAGO, FEBRUARY, 1911 | NO. 2

PUBLISHED MONTHLY BY THE
ELECTRICITY MAGAZINE CORPORATION
ED J. MOCK and PAUL H. WOODRUFF, Editors.

MONADNOCK BUILDING, CHICAGO.
LONG DISTANCE TELEPHONE: HARRISON 3014.

NEW YORK OFFICE .....1433 Hartford Building, 41 Union Square
LAURENCE F. COOK, Eastern Representative.
Telephone Stuyvesant 1672.
LONDON OFFICE.....36 Maiden Lane, Covent Garden
S. RENTELL & Co., Representatives.

Entered as second-class matter May 26, 1909, at the postoffice at Chicago, Illinois, under Act of March 3, 1879.

TERMS OF SUBSCRIPTION.

United States, Cuba and Mexico.....Per year, $2.00
Canada .....Per year, 2.50
Foreign countries within the Postal Union.....Per year, 3.00
Single Copy 20

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CHICAGO, FEBRUARY, 1911.

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THE POSTPONED CONVENTION.

EVEN the most careless observer must feel that there is something doing in telephone politics just now. The sudden and unexplained decision to postpone the annual convention of the National Association from the date fixed, January 17, to February 8, was perhaps the first indication to the field at large that some unusual influence was at work. An Associated Press report, emanating from no less authoritative a source than an officer of the Kinloch (independent) Telephone Company at St. Louis, was another disquieting factor. This report had it that the Morgan interests are working quietly and effectively toward a country-wide control of independent telephony, and that their plans are practically completed for a gigantic coup of that nature.

In the meantime, while the convention waits, Bell, Morgan and independent representatives are holding a series of triangular conferences whose object, in a word, is to put an end to the bitter warfare which has marked the history of telephone development in this country. Elimination of wasteful competition is the slogan at these conferences. The scheme contemplates the withdrawal or absorbtion of one company where two operate competitively in the same community. Where state laws interfere with such a course the plan of interconnecting lines advocated by TELEPHONE ENGINEER must be resorted to.

The conferences have been attended by Theodore N. Vail, for the Bell companies; Henry P. Davison and W. F. Stevens, for the Morgan interests, and a committee composed of Frank H. Woods, E. H. Moulton, Theodore Gary, H. D. Critchfield, Arnold Kalman, George L. Edwards, and B. G. Hubbell for the independents. TELEPHONE ENGINEER went to press before a final conclusion was reached; but with all interests in such good hands, we may rest assured that the outcome will make for the good of the telephone business, whatever it be.

All these things promise an interesting convention. A month ago we said the National Association was approaching a critical point in its career. Evidently the point is becoming more critical as it draws nearer. The association is practically founded upon principles which are being changed, and even reversed, with a rapidity which is astonishing. Those who most bitterly opposed physical connection of lines are now its ardent advocates. Those who were the first to condemn TELEPHONE ENGINEER for the early stand it took on that important matter are now eloqquent in their praise of its editorial policy. Those independents who thought it treason to speak to a Bell man now discuss merger and sale propositions as logical solutions to competitive problems. The

Shoemakers and the Nortons, after all, were merely pioneers in the new view of things, and perhaps suffered for a time the obloquy which often falls to the lot of pioneers.

It was unfortunate that the convention had to be postponed. It was especially unfortunate that the announcement of postponement had to come at so late a date. Many who had prepared to come to Chicago in January, and had so arranged their business, have been unable to alter their plans to meet the changed condition and cannot attend in February. But these things could not be helped. The matters under discussion are of more importance than even the attendance at the convention. Those who do come will be assured of an interesting session, and those who are unable to come will reap the benefits of any new arrangements that may be made.

But even if the Bell-Morgan-independent conferences reach no definite conclusions at the present time; even if the whole discussion circles back to its starting point; we may safely predict that the year 1911 will witness a practical revolution in the telephone conditions of this country.

A NEW BILL IN OHIO.

THOSE who remember the Elson bill, introduced in the Ohio legislature last year, will be interested in its successor, which has just entered the state body for consideration. The Elson bill died an early but timely death. It was always opposed by a majority of the independent telephone men of the state, but its demise may be laid at its own door. It was so blatantly urgent on the point of mergers that it neglected to recognize the prerogatives of the state and the public.

The new bill, too, has a provision permitting the merger of competing companies. With this fact in view, it is interesting to observe that it was framed by a legislative committee of the Ohio Independent Telephone Association, comprised of D. J. Cable, Frank L. Beam and Stephen E. Ward. But the merger provision, declares the committee, is only incidental to the principal purpose of the proposed law, which is a complete supervision of the telephone business of the state in the interest of the public as well as the stockholders in telephone companies. Power of fixing and regulating rates is to be vested in a commission of three, to be appointed by the governor. These rates are to be uniform in the locality for which they are determined. There is to be no possibility for one company to give service away or sell it for less than cost for the purpose of injuring a competitor.

The proposed law gives absolute authority to the commission in investigating the business of telephone companies. Its experts may be sent into plants and offices with full power to ascertain every detail of the business. The commission may also summon officers and employees of telephone companies to appear before it with books and records.

No provision is included giving the commission power to supervise the issue of stocks and bonds. In the matter of granting franchises the present Ohio law which gives municipalities that power is not changed. The commission, however, is given the power of adding its approval to franchises granted and advising as to the granting of them.

The merger feature is perhaps the most interesting, the rest of the bill being framed somewhat on the lines of the Wisconsin and New York commission laws. The independent telephone men of Ohio seem to have recognized that those bent upon mergers will accomplish them in some way, and indeed Ohio has had several recent object lessons in this line. The bill will probably pass this time.

MULTIPLEX TELEPHONY.

SENDING several telephone messages simultaneously over the same wire has been a dream of inventors ever since the telegraph stole a march on its less comprehensible brother and began working its wires for four and even six communications at the same time. We all knew it would be done sometime. Some few ardent investigators even got a glimmering of the solution, and in a delicate labortory way proved that the quest was far from hopeless. Then, without warning, a series of four patents issued covering a practical, operative system of multiplex telephony in all its phases.

Most of the big prizes in telephonic invention go to the engineers employed by manufacturing and operating telephone companies. Perhaps most of us, as civilians, have overlooked the fact that the United States Army and Navy include minds as keen as any that have delved into the mysteries of science. George Owen Squier, a major in the U. S. Signal Corps, found the search for his system of multiplex telephony as entertaining as golf or bridge. We know this because he has obeyed the unwritten law of government service, and has assigned his patents to public use without compensation.

It is impossible to estimate the commercial value of Major Squier's invention. Certain it is that in the hands of a skilled promoter it woul readily have become a source of enormous pecuniary profit to him. The unwritten law is not a law after all; it is scarcely more than a tradition. Who would have blamed this conscientious army officer if he had decided merely to stand pat upon his patents, so to speak, and await in silence the offers and proposals that were bound to come? He has won immortality in telephonic history, it is true. But we blush to admit that in this ultra-commercial country of ours his fame would probably have been all the greater had he sold his idea for a million dollars—a popular figure in talking of the disposal of patents.

Without becoming too personal, we can say that Major Squier is reputed to come of a well-to-do family. To those whose deity is the dollar sign, this fact might seem sufficient explanation of his renunciation of all possible profit in his invention. But we have not observed that those who have money are any the less eager to get it. No; the major would have pursued the same course whatever his personal circumstances. He worked the problem out for pure love of it, and because it is useful to the world—which is the spirit of your true scientist. That is one of the reasons we are so proud of our army and navy.

The practical adaptation of multiplex telephony will be associated with the development of long-distance work. For long distance lines are expensive, both as to construction cost and maintenance. Already nearly every long distance telephone line of any importance is phantomed, because even the gain of fifty per cent on two lines so attained effects an enormous saving. The possibility of a gain of three hundred or perhaps even nine hundred per cent on one line is fairly overwhelming.

But the faculty of multiplying the powers of a line is not the only valuable feature of the Squier system. Its ability to return to the grounded line of our fathers without the attendant cross-talk and interference, in fact with a quality of transmission actually superior to that of the best metallic circuit of today, doubles and trebles its first value.

The Squier system is a hybrid. It partakes of the characteristics of both wire and wireless telephony. Its impulses, while they follow the wire, are guided by its presence rather than its substance, and in their higher ranges are always almost at the point of leaving the conductor and radiating into space. To summarize, wireless telephony imposes its message on an electric current whose frequency of alternation is so high that it prefers the sensitive ether to the sluggish wire. Multiplex telephony uses as its vehicle frequencies not high enough to trust their wings to space alone, yet too high for human perception. And ordinary wire telephony utilizes a current without any frequency of its own, since it is unidirectional until the voice-vibrations change its form. Multiplex telephony is like ordinary telephony in that it follows a common wire. It is like wireless telephony in that it is attuned to certain wave-lengths, and its various transmitting and receiving circuits select their own appropriate vibrations and discard all others.

Not the least interesting part of Major Squier's equipment is the high-frequency generator he uses to deliver his carrying-currents. This machine is remarkable mechanically for its necessarily high speed of rotation. With a rotor a foot in diameter and a speed of twenty thousand revolutions per minute, the enormous peripheral velocity of a thousand feet a second, or twelve miles an hour, is attained. This alone is almost as remarkable a performance as the multiplexing itself.

Multiplex telephony as developed by Major Sqquier is free to everybody. There are no restrictions, no royalties, no licenses, no strings tied to it of any sort. Every one who thinks he can use it is at liberty to do so without restraint. Under these circumstances, it cannot be long before we will see it in general use, with such changes, simplifications and improvements as are bound to come with the eyes of the telephone world all turned upon it. For it is probably the first telephonic invention of any importance that has not been the center of violent patent disputes and commercial warfare.

WHEN EXPERTS DISAGREE.

WHEN experts disagree, who shall decide? The City of Chicago is trying to regulate its telephone rates. City Comptroller Wilson engaged Arthur Young & Co., accountants, and D. C. and W. B. Jackson, engineers, as experts to report on the matter. They found that the Chicago Telephone Company was losing money and should be given permission to raise some of its rates.

The city council committe did not like this report and determined to have one of its own. It engaged as its expert William J. Hagenah, of the Wisconsin Railroad Commission. Mr. Hagenah finds that the company is earning ten per cent on the value of its property and should have some of its rates reduced.

In the contradiction between the two reports there lies no reflection on the ability or the sincerity of either expert. The condition merely emphasizes the fact that there exists no accurate basis for determining telephone rates. Much has been said on the subject; but the laws laid down differ from each other as the men who propound them.

The number of considerations involved in a rate determination is enormous, and the majority of them are of a nature to permit differences of opinion. When an expert's constructions of the doubtful points lean all in one direction, his final result may be widely at variance with that of one whose tendencies are in the opposite direction.

We are in urgent and immediate need of an exact system of telephone rate finding—one that will be accepted without question by commissions and city councils. Those bodies which instigate rate investigations do not always appreciate the manifold opportunities for error to creep in; which makes the disagreements of experts rather embarrassing.

FEATURES OF COMMISSION REGULATION.

THE relations between public utility companies and the communities they serve are very close. That a company may be enabled to do business at all it is very necessary that it be granted a franchise giving it the right to use the public streets. It thus becomes possible to construct the necessary plants with the least possible outlay, reducing the capital charge on which a fair return may be earned to a minimum and thus helping to make the rates for service as low as possible.

The public having granted such franchises and the opportunity to do business without injurious competition, is entitled to demand that the service be of high efficiency; that the company shall extend its lines reasonably, and that the rates shall be commensurate with the service. And the money invested in good faith in an undertaking of this kind, which meets the demands which the public makes upon it, is entitled to a fair return on the value of its active property.

The effort to preserve the rights of both parties has led to the organization of state commissions with the power of supervision over public utilities and their difficulties with their patrons. Such bodies should have the power to adjust rates, see that service is up to standard, and that it is supplied wherever reasonably required.

The nature of the duties delegated to such commissions makes their function a judicial one, and their members should be endowed with judicial ability. The matter of rates is one of utmost importance. While it has been established that a company may demand a fair return on the value of its necessary property, yet what is fair compensation in one instance may not be in another, and no general rule can be laid down, even for the same company in different stages of its progress and development; all of which must be considered impartially by the commissions.

But while it is essential that commissions should establish some sort of a standard of operation which would insure definite rates, where the cost of operation and consequently the cost to the consumer have been lowered solely by efficient management, the company should be favored with even a higher rate of return on its investment. Not to allow this would be to put a premium on inefficient management by depriving the company of any strong reason for the employment of a higher grade of ability.

Provision must also be made for depreciation of plant, etc., and as the specific rate of depreciation varies

quite materially for the different material of a telephone system, the commission must necessarily be well informed regarding such matters.

Another matter commissions are called upon to decide, and one even more complex than the adjustment of rates, is the amount of securities which may be issued by any company. They must determine the value of the property represented before they can approve any securities which the company may wish to issue. In launching any public enterprise it is essential that the necessary funds should be secured at as low rate as possible, and this usually necessitates a bond issue. The amount, however, should be such that the annual fixed charge is considerably less than the net earnings.

There is a prejudice against commission regulation among many public utility operators. It is interesting, then, to note that in states where commissions are in operation, the companies find little difficulty in securing the necessary funds for extensions at a very low cost in discount on their securities because of their sound basis of operation.

GOING VALUE AND RATES IN OKLAHOMA.

THE Supreme Court of the state of Oklahoma apparently has established the law governing regulation of rates by public service corporations in that state. The case involved the reasonableness of rates by a telephone company.

The decision involved a discussion of the question of the valuation of the property, the right and obligation to create a depreciation reserve fund, and the rate of return. These three questions were the subject of contention between the telephone company and the corporation commission of the state, from whom the case went to the Supreme Court.

The recent decisions of the Supreme Court of the United States in the Consolidated Gas Company case and the Knoxville Water Company case were followed closely by the Supreme Court of Oklahoma. Its opinion is along most conservative lines, which must give great comfort and encouragement to all investors interested in public service corporations operating within that state.

A ruling of the Supreme Court of the United States that the present value of the property used in furnishing the service is a basis upon which to measure the reasonableness of the rates in question was adopted by the Supreme Court of the state. It held that in valuing the property of a public service corporation dedicated to the use of the public, such valuation should not be limited to the value of the property as a "going concern." The court said upon this point, among other things:

> There is no contention that any value on account of unexpired franchise or for good-will should be added to the reproductive value in order to ascertain the present value, but it is contended that by reason of the fact that appellant's plant has an established system of operation, has at present customers sufficient in number to pay the operating expenses and annual depreciation and some profit, it has a value beyond the mere cost of reproducing the plant. This element of value contended for has been generally referred to by the authorities as the "going concern value," or "going value."
>
> It is apparent, however, that a complete telephone plant, without a single subscriber, or with but few subscribers, is less valuable to both the owner of the plant and to the members of the public it serves than the same plant with large patronage. The more people a subscriber can communicate with over a telephone exchange, the more service, as a general rule, is such exchange to him; and it is only when such exchange has subscribers that the property of the owner invested therein has an earning power. But subscribers are not obtained without expenditure of money, labor and time, during which the capital invested in the plant earns nothing and often fails to pay operating expenses.
>
> During the term of development there is a loss of money actually expended and of dividends upon the property invested. How shall this be taken care of? Must it be borne by the owner of the plant? Or by the initial customers? Or shall it be treated as part of the investment or value of the plant constituting the basis upon which the charges shall be made to all customers who receive the benefits from the increased service-rendering power of the plant by reason of those expenditures? It seems that the last solution is the original, just and correct one. If rates were to be charged from the beginning so as to cover these expenditures and earn a dividend from the time a plant is first operated, the rate to the first customers would be in many instances, if not in all, so exorbitant as to be prohibitive and would be so at the time when the plant could be of least service to them. On the other hand, the public cannot expect as a business proposition or demand as a legal right that this loss shall be borne by him who furnishes the service, for, investors in public service property make such investments for the return they will yield; and, if the law require that a portion of the investment shall never yield any return but shall be a total loss to the investor, capital would unwillingly be placed into such classes of investments; but the law, in our opinion, does not so require. Private property can no more be taken in this method for public use without compensation, than by any other method. When the use of the property and the expenditures made during the non-expense paying and non-dividend paying period of the plant are treated as an element of the value of the property upo which fair returns shall be allowed, then the burden is distributed among those who receive the benefits of the expenditures and the use of the property in its enhanced value.

Applying this ruling to the case before it, the court added a sum equal to twenty per cent of the value of the physical property of the comapny as a "going concern" value.

Upon the question of depreciation the commission had held that a sufficient allowance for current maintenance would be sufficient, while the company contended that there must be created a depreciation reserve fund to take care of depreciation which could not be taken care of by current maintenance repair, and that this fund should be taken from the gross earnings of the company. The court approved of the position of the company in this question saying, among other things:

> All the evidence is to the effect that there is at all times going on in a plant of this character a depreciation that cannot be overcome by repair. It is rare that any physical property impaired by time and use can be so repaired as to be the equivalent of the same property now. There comes a time in the life of physical units when they cannot be made usable by repair, and they must be discarded and replaced by new properties, which requires the expenditure of capital.

The court then quotes and adopts a decision of Mr. Justice Moody on this point in the Knoxville water case.

Upon the question of the rate of return the court follows the ruling of the United States Supreme Court in the Consolidated Gas Company case, and while it does not undertake to say what is a reasonable rate of return, it does say practically that the legal rate of interest allowed by the laws of the state would be the minimum rate of return, and that the maximum rate of return would depend upon the character and location of the enterprise, intimating that such a maximum would be higher in the cities and state of Oklahoma than it would be in the most settled part of the country.

It is obvious that all the principles laid down in the opinion of the Oklahoma court are quite as applicable to public utilities in any other state. They form a guide to rate regulation that many self-appointed regulative bodies, and indeed some state commissions, are much in need of.

Physical Culture for the Operators.

The Welfare of the Operator

By H. N. Foster

"HOLD-UPS" have been quite too common during the last few months to give one a sense of security, and an order heard on a dark street to hold up the hands would probably cause a convulsive response, quite disastrous to a nervous system.

In our illustration, however, this group of happy girls seems to have responded quite cheerfully to the command to hold up the hands. On the roof of one of the high office buildings, in the heart of Chicago, at the command of their teacher they are taking gymnastic exercises, filling the lungs with fresh air and getting the blood into perfect circulation.

It is probable that comparatively few Chicago people know that in the very heart of Chicago's congested, busy district, there is a school for telephone operators, where hundreds of young ladies are yearly being instructed in the art of operating. This telephone school has many unique features, but possibly none will seem more surprising than the provision for open-air calisthenics.

In the last few years, it would seem as if a great wind swept over the country, carrying fresh air into homes and offices and schools; and instead of shutting out the air so carefully as our grandparents did, we are now prescribing it as the one thing to prevent most of the ills of life.

A young lady upon entering the telephone school, must pass a rigid health examination, and the effort is made by the school to make the conditions right to keep her strong and well. This examination upon entering the school, serves two purposes, in assuring good service to the company, and protecting other employes. No one can enter this school with any trace of tuberculosis or other diseases which could endanger other operators, and no one with weak nerves or heart who would not be adapted to in-door employment is passed in this physical test.

One step in the process of keeping girls well and in best condition for study, is to have rest times when different classes repair to the roof for fifteen minutes of calisthenic exercises under a competent teacher. When the days are cold, the girls wear sweaters and come back to their school rooms with cheeks glowing with color, nerves relaxed, and minds clear and ready for work.

The company has such faith in the fresh-air theory, that every morning before the heaviest traffic, the young ladies at the boards in the operating rooms put on their wraps while every door and window is

Recitations in the Telephone School.

The Telephone Graduating Class.

thrown wide open. Some of the offices, besides being supplied with the most approved ventilating systems, have introduced ozone generators, which give one a sense of breathing the pure air of the mountains.

The school is provided with health bulletins, containing some of the practical suggestions for hygienic living, which are given to the students. Twice a week, lectures on the body and how to take care of it, are given by a competent physician.

Another unique feature in this school is the way in which many of the lectures and much of the class recitations are carried on. In an ordinary class room, one hears the teacher and students asking and answering questions. In the Chicago telephone school, in watching teacher and students, you will notice their lips moving, but practically no sound is heard. This is accounted for, as close scrutiny of the picture will show, by the fact that both teacher and students are wearing the regular transmitter and receiver and that the conversation, lectures, etc., are actually carried on over the telephone. This practice is an extremely valuable one, in that it readily and quickly trains the student's ear and voice to the use of the telephone, and the constant practice enables one quickly to acquire the telephone voice and to learn to modulate the voice properly. It also considerably facilitates the training and correct enunciation of words and particularly of various numbers. It is obvious that where forty or fifty transmitters are tied together, they would be likely to pick up so much noise that the voice would be indistinct. To guard against this, the teacher's transmitter is always provided with battery and the sets are so wired that she can talk to all her students at once. Their sets, however, are wired through keys on her desk. In order that any one may talk to her, she depresses a small key, thereby giving battery to a group of three or four so that they may recite.

While the course of training in a telephone school does not occupy the four years of a high school course, yet the three to five weeks required to make efficient operators bring about a class feeling which finds expression in class pictures, class colors and graduating exercises, which are enjoyed quite as much as are other schools' festivities. The excitement over the decision as to the exchange where the graduate will be placed for further instruction and the exhilaration of having her first money (for the most peculiar feature in this school is being *paid* for going to school) make a very enthusiastic graduation, and a very loyal class of young women who go out to serve the City of Chicago.

Telephones in Switzerland

Consul General R. E. Mansfield, Zurich, says that the general use of the telephone and telegraph in Switzerland is due to the fact that excellent facilities for communication are provided. Practically every post office in the country is provided with a public telephone and telegraph, and every community, no matter how remote, is supplied with both services. Rates are low, and every inducement is offered to the public to use the telephone and telegraph as means of communication.

The telephone rates to subscribers for each call, for a conversation lasting three minutes, are as follows: Within the city, town, or community in which the telephone is located, one cent; interurban calls, not exceeding 32 miles, six cents; not exceeding 64 miles, ten cents; exceeding 64 miles, anywhere in the country, fifteen cents; for night service the last three divisions are four, six, and nine cents, respectively.

The telegraph service is also inexpensive, the rate being six cents for each telegram and half a cent per word, making the cost of a 10-word telegram eleven cents, or sixteen cents for a 20-word message.

The cost of administration of the telegraph and telephone service for the year was $3,222,000, and the receipts $3,223,000, leaving a balance of $1,000 profit to the government.

The total number of telegrams sent and received during 1909 was 5,202,969, which are classified as follows: Within the republic, 1,557,450; international, 2,541,454; in transit, 1,104,065. The percentages of business for the year is classified as follows: Telegrams for the federal and local governments, 1.96; for the various stock exchanges, 2.81; commercial, 36.05; private, 58.18; the press, 1.

The telephone statistics give the following for the year: Local calls, 41,417,376; interurban or long-distance calls within the country, 8,879,537; international calls received, 259,095, sent, 253,354; international calls for which no fees were charged, 140,600. Total interurban and international conversations, 9,532,586; total conversations, 50,949,962; telegrams transmitted by telephone, 391,719; total telephonic communications for the year, 51,341,681. The population of Switzerland being about 3,500,000, the foregoing service shows that there were 1½ telegrams and about 15 telephone communications per capita during the year.

Telephones in Northern Spain

Consul-General Henry H. Morgan, Barcelona, reports that not much has been done in northern Spain toward bringing the telephone service under municipal management. The principal company operating has its head offices in Barcelona, and has telephone station in Madrid, Barcelona, Bilbao, Tarragona, Reus, Sabadell, Tarrasa, Mataro, Arenys, Argentona, Calella, Martorell Igualada, Capallades, Olesa, Palamos, San Feliu de Guixols, Palafrugell, and La Bisbal. The actual number of subscribers at the end of September, 1910, amounted to 3,795. The service is operated by women.

Gerona and Zaragoza have each a private telephone company. The actual number of subscribers on October 1, 1910, was 150 and 600, respectively.

The city of San Sebastian has a municipal telephone service, which has been operated since July, 1909, under a concession obtained from the government. Its central station has a capacity of 1,080 local and 60 interurban lines, divided into sections of 120 lines each. The system in use is called "Bateria central," constructed in Belgium. The wires are partly overhead and partly subterranean, the present installations being capable of serving 2,000 stations. The lines are insulated with paper, and the line work was constructed by a German company. The actual number of stations in operation is 850.

The Santander system has been under municipal management since August, 1910. The approximate number of stations in use at the present time is 1,100.

In Bilbao the telephone is still operated by a private company, the idea of the city purchasing the service having not yet been considered. The number of telephones now in use in the city is 1,800. The instruments are made in Sweden and a few desk apparatus in Paris.

Convention of Northwestern Cedarmen

THE Northwestern Cedarmen's Association held its fifteenth annual convention January 10 and 11, at Minneapolis, Minn. The meetings were held in the Empire room of the Hotel Radisson.

After Secretary H. H. McKinney had called the roll and read the minutes of the last annual meeting, held at Chicago, President T. M. Partridge delivered his annual address. One of the most important points he brought out was the matter of insurance. During the unusually dry season last summer a number of insurance companies took advantage of a clause in the Minnesota state laws granting them that privilege, and cancelled insurance of cedar stocks on ten days' notice. This resulted in an absolute lack of protection for many such stocks while forest fires were raging, despite the fact that insurance on them had been paid when there was less danger. The association in consequence will work for an amendment of the state law to accord more nearly with the Wisconsin provision, which requires sixty days' notice instead of ten. President Partridge said in part:

Thomas M. Partridge, President.

There are a number of very important matters to be considered at this meeting and others just as important that should be considered.

Not the least of these is the matter of fire insurance. During 1908 Mr. Clark, as chairman of the fire insurance committee, accomplished wonders in the reduction of premiums. So far as minnesota is concerned the fires of last fall have undone Mr. Clark's work and it has got to be done this result. This is of more general importance than any this result. This s of more general importance than any matter that will come before us.

The "Prevention of Forest Fires" will be the innocent title of a matter that demands attention. Unless this matter is carefully looked after by all interested parties there is going to be some drastic legislation by the various state legislatures of the three lake states, which will materially increase our logging expense without affording commensurate protection. In this state the last legislature passed a law requiring all slashings to be burned before May 1 following. This has not proved successful and has resulted in some of our most disastrous fires. General Andrews, our state forestry commissioner, is now urging the passage of a new bill during this winter's session, requiring all limbs and slashings to be burned and entirely consumed at the time they are cut, on a hot fire of live coals prepared for that purpose. The expense of such a procedure would be enormous and the principle impracticable.

In fact the Forest Fire Conference, held in St. Paul the early part of December last, passed a set of resolutiohs that I believe should be partially adopted by this association and every effort made to see that our interests are safeguarded. In this same connection our governor is urging legislation providing that our forest shall be adequately protected by the state authorities and the cost of such protection borne by the timber owners. No provision has been suggested what this expense shall be or where it will end.

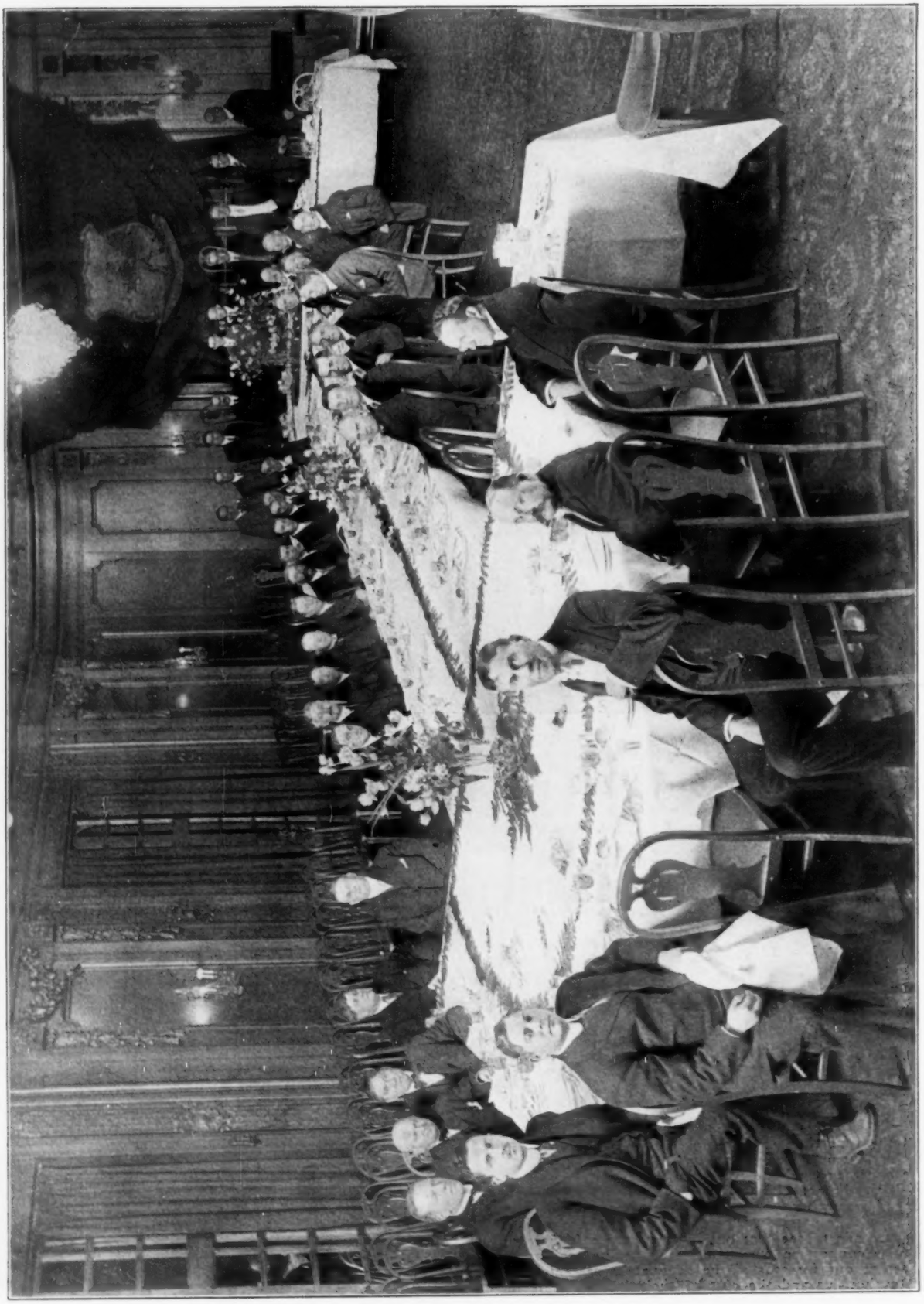
Now just a word in regard to the business conditions which confront us. You will note by the comparative statistics which our secretary has prepared for us, the enormous reduction in stocks of both posts and poles. This certainly means something to us. A condition has now been thrust upon us that we should not be slow in taking advantage of. The volume of trade during the past year has been good. More than double the preceding year. During this increased demand and reduction of supply our prices have not improved proportionately. In the absence of any combination for our own betterment are we also immune to the recognized law of supply and demand. Prices during the past year have not been altogether satisfactory. They now are very low on some sizes, but are showing improved strength in spots. We cannot forever continue to sell our products at about the cost of production. We are entitled to a living profit. Let us pull together and see if we cannot improve this unfortunate condition of our business. The promise of a large demand during the coming season seems to be assured. This is especially true of class poles, for which there is a growing demand from all sources of consumption, creating a serious problem with which sooner or later we have got to contend. What are we going to do with the stock that is left after taking out the class? There is a remedy. We have got to demand such a spread in prices between class and woods-run poles that there will be no particular economy in the purchase of class stock. We must make a united effort to sell our stock woods-run.

President Partridge expressed a wish to give special thanks to the railroad committee for its efficient work during the year. He mentioned especially the reduction in minimum carload weights of cedar products secured through the efforts of that body.

A letter from E. H. Valentine was then read, in which he expressed his regret that he was unable to be present. Mr. Valentine is the association's only honorary member, and formerly took a very active part in its affairs.

The annual report of Secretary McKinney was then read, and proved very interesting. The report follows:

A review of trade conditions in the white cedar market for the year 1910 shows that as far as prices are concerned it was not what was anticipated at the opening of the year. At that time the indications for a good year's business at reasonable prices was excellent. Reports of stocks on hand January 1, 1910, showed there was not an over supply in any of the sizes and the estimated output for the winter was below the average. Inquiries for stock at a fair price were numerous, all of which pointed to a good year. For the first few months business seemed to bear out the prophecy, when a sudden tightening of the money market, railroad agitation, dry weather and other causes, made themselves felt in the pole end of the industry. From then on, while there was a



The Banquet of the Northwestern Cedarmen's Association, Annual Convention, Minneapolis, January 10.

considerable movement of stock it was at prices often below the cost of production.

Outside of the amount of stock sold during the year, there was a heavy loss by fire which has further reduced the dry stocks on hand January 1, 1911, so that with reasonable market conditions there should be very little old stock left in the hands of the dealers by the time the new stock is in shipping condition.

In connection with the loss of yard stock during the year by fire, there was considerable standing cedar fire-killed. No doubt some of this will be logged this winter to save it, and the product placed on the market. While this stock may be perfectly sound, if it is shipped with other stock it will raise a question as to whether it should be classed with dead timber, or considered merchantable, as covered by our association specifications. This question should be settled by our inspection committee to save further trouble.

Our specifications are rather indefinite as to the measurement of crook in sizes up to and including 4 inch to 25 feet. The amount of sweep allowed is plain, but it would seem that in arriving at the amount of crook, especially in the 20 foots and the 4 inch and 25 feet, that the measurement should not be taken from the top to the extreme butt, but rather from some point above the butt, any 4 feet for example. Probably 18 foots would properly come under the same head.

From time to time the secretary has issued tariff reports covering any changes in the tariffs affecting the territory covered by our freight rate book. There have also been issued two market reports, report of poles shipped during February and March, stock on hand April 1, poles shipped during April, stock shipped during April and May, stock on hand July 1, 1910, as compared with July 1, 1909, and a report of stock destroyed by fire. The report for the estimated cut for the present season and the report of stocks and bonds January 1, 1911, as compared with January 1, 1910, you have had handed you this morning.

Under a resolution passed at the last annual meeting, the affairs of the Bemidji Weighing Association, composed of members of this association and others engaged in the cedar business on the M. and I., have been handled through this office. A large number of cars were check weighed at Bemidji during the year and proved very satisfactory to the members. The cost per car for this service was 28 cents.

At present the association has a membership of thirty. Five firms have withdrawn from the organization during the year. They are the Deer River Lumber Company, Kellogg Switchboard and Supply Company, S. E. Thompson, W. C. Church Lumber and Coal Company and Backus-Judd Lumber and Cooperage Company. The membership of the Deer River Lumber Company was transferred to the Joyce-Watkins Company, that of the Kellogg Switchboard and Supply Company to E. C. Norton, who succeeded the company in business. One new member, Meloney Bros., of Spooner, Minn., was admitted to the association, making a net loss for the year of three members.

Treasurer W. B. Thomas presented the following statement of the finances of the organization:

Balance on hand January 5, 1910	$1,206.63
Receipts from dues	2,200.00
One admission fee	100.00
Interest	35.00
Total	$3,541.63
Disbursements as per voucher	2,621.20
Balance December 31, 1910	$ 920.43

The president announced that at the afternoon session a paper on fire insurance would be read by R. M. Ritchie, Duluth. After the names of the various standing committees had been read the convention adjourned, meeting again at 2:30 P. M. Mr. Ritchie then addressed the convention in part:

The past two years have been strenuous ones for the fire insurance companies. The losses on timber products have been very large, due to the extreme dry weather. The seven or eight years previous to 1909 have been abnormally wet years, and the forest product class had shown a good profit to the insurance companies, and rates had been materially reduced. The year 1909 was not profitable, but no change was made in rates. The year 1910 was by far the worst, and now the insurance companies are wondering if 1911 will be as dry, and the losses as great as in 1910.

When losses exceed the premium on any class, either the insurance companies must have premiums or the losses must be reduced. Naturally you prefer to reduce the losses rather than to have rates increased.

A basis or minimum rate is fixed according to fire protection. To this basis rate you are penalized for deficiencies, or rather for lack of following the company's plan. For instance, one thousand feet from heavy forest is fixed by them as the reasonably safe distance your material should be piled; now, if your material is within two hundred feet a charge of seventy per cent of the basis is made, and for every additonal hundred feet over two hundred feet the charge is diminished.

Peeling in a yard means that there is the hazard of peelings lying around which aid considerably in spreading a fire. Therefore there is a penalty of twenty per cent of the basis for peeling. This charge can be reduced if the peelings are removed daily, to ten per cent of the basis.

A steam boiler in a yard with the stack throwing out sparks is surely a hazard over that of a yard without one, therefore another penalty of ten per cent of the basis.

There are a number of other penalties of like character, all based on known hazards. The insurance companies stand ready at all times to recognize conditions which better your yard, by making concessions in the rate.

The standard form of policy in this state provides that in case of loss by fire and "whenever the company shall pay any loss, the insured shall assign to it to the extent of the amount so paid, all rights to recover satisfaction for the loss or damages from any person, town or other corporation." If you have in any case released your rights against any corporation, then the insurance companies have not the right of recovery.

The question of co-insurance is another feature that the companies recognize by concessions in the rate. As most of you know, the use of the co-insurance clause is optional with the insured in this state by law, and can only be used by the companies upon written request by the insured, and then only where a reduction in rate is allowed. Rates generally are based on insurance equal to about eighty per cent of the value, and if insurance less than eighty per cent is carried, then rates should be higher as the salvage would average less.

As to obtaining insurance the coming year, I believe that there will be no difficulty in securing insurance on established yards that have the woods and brush cleared back for from two to five hundred feet or more, and you show an inclination to live up to the insurance company's requirements.

As to rates, on account of the excessive losses for the past two years, you may have to stand for some increase, but I think you will find that even after any increases are made, that you can bring your rates down again by careful compliance with the company's requirements.

After a vote of thanks to Mr. Ritchie, a discussion took place comparing the Wisconsin and Minnesota laws, and the members of the association were urged to write to their representatives in the Minnesota legislature urging an amendment of the ten-day clause to sixty days. A committee was appointed t ohandle the matter, consisting of Joseph Meloney, chairman; E. S. Clark, T. P. Bradley, W. T. Moss and M. H. Coolidge. President Partridge was made an ex-officio member of the committee.

The report of the inspection committee, H. S. Gilkey, hairman, brought out considerable discussion relative to various points in the inspection rules and comments thereon. The committee recommended no change in the rules regarding live timber, but suggested as changes in standard specifications that the 20-foot poles be added to the list of those allowing a four-inch crook one way and the 25-foot poles be eliminated from those allowing a 5inch crook. The committee also recommended that the standard tele-

graph, telephone and electric poles should be 4-inch 25 feet and upwards, instead of 5-inch 25 feet as at present.

L. L. Hill moved to amend th ereport by making 18 and 20-foot poles subject to 4-inch sweep taped four feet from the butt and that 4-inch 25foot and larger be taped six feet from the butt.

T. P. Bradley offered a further amendment to the effect that 4-inch 25-foot poles should measure 12 inches in circumference at the top when seasoned and 12½ inches when water soaked or green, and that 20-foot poles take the same circumference measurements as longer poles.

After discussion the proposed amendments and report of the committee were adopted. The incoming inspection committee was instructed to re-write the rules and the comments in accordance with the changes adopted. The chair then appointed a special committee to consist of himself, H. S. Gilkey, L. L. Hill, H. H. McKinney, E. L. Clark and T. P. Bradley.

C. H. Worcester, chairman of the railroad committee, not being present, H. F. Partridge was called upon to report for that committee. He said that the chief thing accomplished by the committee during the year had been the successful effort to block the railroads in their effort to raise minimum weights from 24,000 pounds for cars thirty-three feet and shorter and 30,000 pounds for cars thirty-four feet and longer to 30,000 and 34,000 pounds respectively. The committee also stopped an advance in freight rates from points on the Minnesota & International to the Minnesota Transfer

T. P. Bradley, pole committee, reviewed the conditions of the trade during the past year and called special attention to the stock sheet of the association and to the probable input of poles during the present winter.

Tuesday evening the members and guests of the association sat down in the ball room of the hotel to the fifteenth annual banquet of the association. The Minneapolis members had provided a most satisfactory feast, and the table was beautifully decorated with roses, smilax and ferns. The Masonic Quartette, with an orchestra, led the singing. A number of songs were prepared for the occasion to the music of familiar pieces, and their rendition created much amusement.

This is another view of Tom, who made the best little speech of any president. The feet are Gilkey's. Tom lays no claim to them.

In the election of officers, the chairman asked for an informal ballot, the three candidates receiving the largest number of votes to be voted for on the formal ballot until one of them received a majority. As a result T. M. Partridge received ten votes to succeed himself in office, and his re-election was made unanimous.

E. C. Norton, Escanaba, received the largest number of votes for vice president, and the secretary was instructed to cast the unanimous vote of the convention for him.

The convention unanimously recommended the re-election of elW. B. Thomas to the office of treasurer. Retiring directors J. W. Benham and H. S. Gilkey were also re-elected.

The retiring vice president, J. E. Gerich, was extended a vote of thanks for his services during the past year, the Minneapolis members of the association were thanked for their hospitality, and the convention adjourned.

Those of the trade present at the convention were:

E. D. Agler, T. M. Partridge Lumber Company, Tenstrike, Minn.

J. W. Benham, Naugle Pole & Tie Company, Chicago.

M. K. Bissell, Erickson & Bissell, Escanaba, Mich.

T. P. Bradley, Duluth Log Company, Duluth.

Hall L. Brooks, Hall L. Brooks, Tomahawk, Wis.

E. L. Clark, Valentine-Clark Company, Chicago.

M. H. Coolidge, Coolidge-Schussler Company, Minneapolis.

L. K. Deal, L. K. Deal Lumber & Coal Company, Des Moines.

H. M. Dixon, Cloquet Tie & Post Company, Cloquet, Minn.

C. E. Evleth, St. Paul.

L. A. Furlong, Valentine-Clark Company, Chicago.

J. E. Gerich, MacGillis & Gibbs Company, Milwaukee.

H. S. Gilkey, Pendleton & Gilkey, Minneapolis.

John Gwennap, Western Union, Chicago.

L. L. Hill, Page & Hill Company, Minneapolis

A. D. McIntyre, Natinal Pole Company, Escanaba Mich.

H. H. McKinney, secretary, Minneapolis.

Joseph Meloney, Meloney Bros., Spooner, Minn.

J. P. Miller, Minneapolis Cedar & Lumber Company, Minneapolis.

J. M. Miller, Minneapolis Cedar & Lumber Company, Minneapolis.

W. T. Moss McCulloch & Moss Minneapolis.

A. T. Naugle, Naugle Tie & Pole Company, Chicago.

Jos. Naugle, Naugle Tie & Pole Company, Chicago.

E. C. Norton, E. C. Norton, Escanaba, Mich.

L. A. Page, Jr., Page & Hill Company, Minneapolis.

Wm. S. Patch, Crawford Cedar Company, Menominee.

T. M. Partridge, T. M. Partridge Lumber Company, Minneapolis.

H. F. Partridge, T. M. Partridge Lumber Company, Minneapolis.

H. W. Reade, National Pole Company, Escanaba.

F. C. Reichmuth, Minneapolis.

R. M. Ritchie, Manley-McLennon Agency, Duluth.

Milton Schussler, Coolidge-Schussler Company, Minneapolis.

W. B. Thomas, White Marble Lime Company, Manistique, Mich.

Gilbert Wilson, Valentine-Clark Company, Chicago.

H. B. Waite, H. B. Waite Lumber Company, Minneapolis.

Geo. Willson, Minneapolis.

J. E. Zeluff, National Pole Company, Escanaba.

A System of Multiplex Telephony

By C. K. Larson

UNITED STATES patents numbers 980,356, 980,357, 980,358, and 980,359, granted January 3, 1911, to Major George O. Squier of the United States Army and dedicated by him to public use, cover a system of multiplex telephony and telegraphy. Major Squier has been experimenting for some time with the transmission of several simultaneous messages over a single wire without interference. The success of his investigations, as announced in these patents, marks an epoch in the history of technical telephony. It is a subject which has long attracted experimenters, and records are not lacking of former trials, both in this country and Europe, notably Germany.

Major George Owen Squier, United States Signal Corps.

As is well known, all manifestations of sound, light and electricity are regarded as depending upon variations in the rapidity of ether wave vibration. A popular explanation of Major Squier's invention would be that he uses that portion of the vibratory scale lying between the lower or audible vibrations of ordinary telephony and those higher vibrations upon which space telegraphy or wireless transmission depend. Vibrations above twenty thousand cycles per second approximately cease to be audible. The frequencies employed by wireless telegraphy extend upward from a hundred thousand to several million per second. Between twenty thousand and a hundred thousand cycles per second lies an unexplored field, whose vibrations are neither low enough to be audible nor high enough to radiate into space from the conductor.

It must not be understood that Major Squier by any process renders these higher vibrations actually audible. Rather he imposes the lower and audible vibrations upon the higher and inaudible and makes the latter a vehicle for the former. This explanation is perhaps a little obscure from the layman's viewpoint, but will doubtless be readily grasped by the experienced telephone man.

As stated before, Major Squire's field of operations lies between twenty thousand and a hundred thousand cycles per second. The result is that he can transmit as many messages over one circuit as there are reasonably different frequencies betwen twenty thousand and a hundred thousand. The principle is quite analagous to the familiar harmonic ringing system, which is quite extensively used at present on party lines. The receiving and transmitting apparatus are simply tuned to certain frequencies and refuse to respond to any other frequency. The voice current imfrequencies selects its own receiving apparatus and does not interfere with other receiving apparatus in the same circuit. A well-known phenomenon of high frequent currents is that when the frequency rises the current leaves the center of the conductor and confines itself more and more to the outer portions. This "skin effect," as it is called, increases with the freqrency, until finally the current leaves the conductor altogether and is radiated into space. Frequencies as low as those of voice currents confine themselves entirely to the conductor. Frequencies as high as those of wireless telegraphy desert the conductor entirely for the surrounding ether. The frequencies between these two extremes, as used by Major Squier, while transmitted largely through the ether still confine their energies to the path of the conductor, following it as a guide. A very low amperage is used in the Squier system, which avoids heating effects, and the employment of condensers of very small capacity renders a return wire unnecessary by barring out all possible disturbing currents whose frequency would be low enough to be audible. The telephone instruments used in the Squier system are of the ordinary type, and in fact no special apparatus is used in any part of the circuit, although some of it is new in the telephonic sense.

The method of tuning each transmission current with its particular receiving apparatus makes it possible not only to send a number of the attuned currents over the same line, but also to operate them over a line which at the same time conveys ordinary battery telephone current, or in connection with a telegraph system. The total elimination of cross-talk is

another feature of the system. Major Squier's process has several features in common with wireless telephony. Among them is the use of the detectors commonly employed in wireless telephone work. It

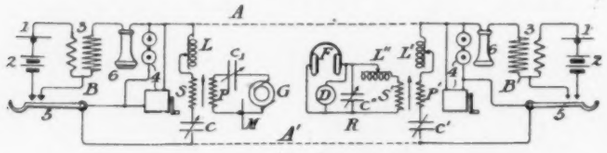


Fig. 1.

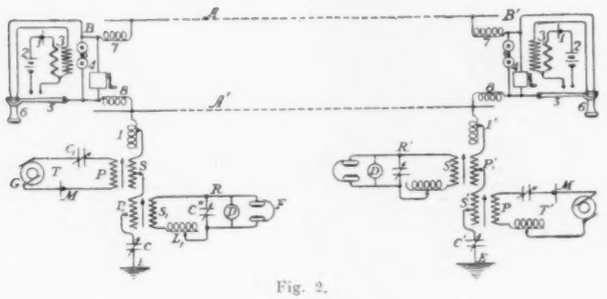


Fig. 2.

is necessary to use these detectors because the ordinary telephone receiver, sensitive as it is to minute impulses of electrical energy, is mechanically unable to respond to the higher vibrations employed by the system. The period of vibration of a telephone receiver diaphragm corresponds approximately to the range of audibility, and its inertia, slight as it is, is far too great to allow it to respond to anything like a hundred thousand vibrations per second. Furthermore such vibrations are in themselves inaudible, so that if the receiver diaghragm could respond to them the results would be inaudible to the human ear. Another objection to an electro mechanical receiver

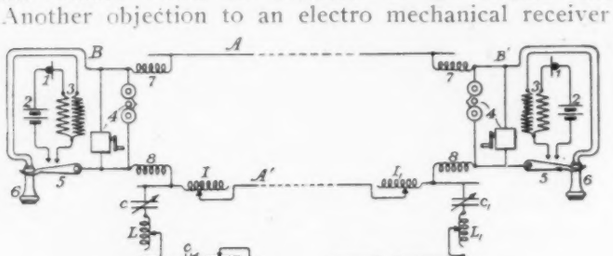


Fig. 3.

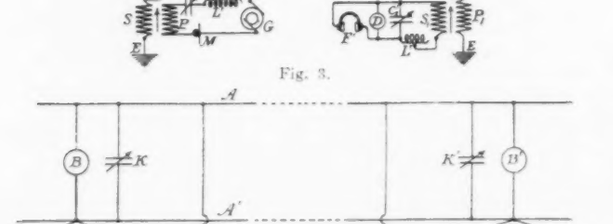


Fig. 4.

such as the ordinary telephone instrument is the high self-inductance which it offers to high frequency current. Any radio detector which will transform the rapid vibration into effect within the range of audibility may be used, although Major Squier prefers the audion or perikon detector.

Referring to the diagrams, Fig. 1 shows a metallic telephone circuit terminating in the ordinary telephone instruments *B* and *B'*. *1* is the transmitter microphone, *2* is the local battery, and *3* is the primary of the induction coil. The generator and ringer are shown by *4*, and the switch hook and receiver by *5* and *6* respectively. When the receiver is off the hook the secondary of the induction coil *3* is bridged across the line wire, *A*, *A'*. So far the circuit does not vary from that of ordinary usage. In connection with this set at any convenient point the variable inductance *L*, the variable capacity *C* and the secondary of a transformer *S* are bridged across the line wire. The transformer's *P* is in series with a high frequency generator, which is shown at *G*. In the circuit of this high frequency generator is included a variable capacity C_1 and a microphone transmitter *M*. The transformer is of the variable type as shown.

Across the receiving end is bridged a similar circuit. A variable induction is shown by *L*, a variable condenser by *C'* and the primary of the transformer

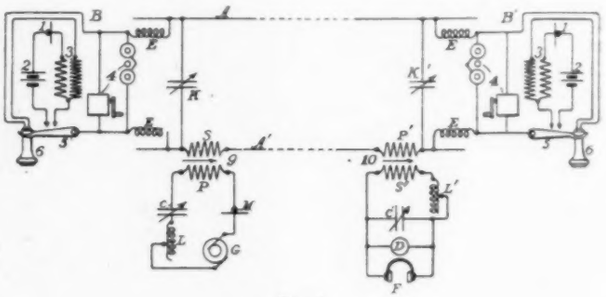


Fig. 5.

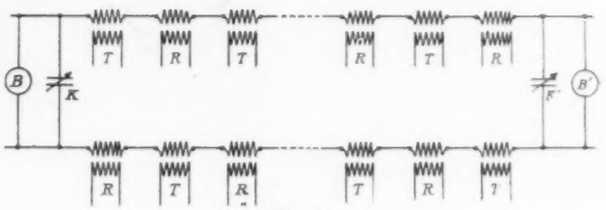


Fig. 6.

by *P*. The transformers secondary, *S'* is in series with a variable inductance *L''* and the variable capacity *C''*. The high frequency detector *D* previously mentioned is shunted around the condenser and connected with the telephone receiver shown at *F*. The impulses or oscillations from the high frequency generator are impressed through the transformer on the circuit containing the inductance and capacity *L* and *C*. Traveling over the line wire these vibrations are received by the circuit at *R*. Any modification of the high frequency currents becomes immediately inaudible in the receiver of the oscillatory circuit.

In the meantime any ordinary voice current sent through the line wires between the two ordinary telephone sets in the usual manner will not affect or be affected by the high frequency current in any way. Thus the ordinary telephone current and the high simultaneously without interference over the same simultaneously without inteference over the same

line. The variable capacity and inductance permit the tuning of the line and circuit to the frequency of the generator, and these condensers are of such very small capacity that they will not pass any of the ordinary voice currents, while permitting the high frequency current from the generator to pass.

Fig. 2 shows a series multiplex system successfully operated by Major Squier. Fig. 3 shows a grounded return system in which the high frequency apparatus is connected on one side with the telephone system and is grounded at the other side. Fig. 4 shows a grounded line system and the manner in which a number of high frequency stations are connected to the same circuit for simultaneous transmission of messages. In this diagram B and B' indicate the telephone sets. In Figs. 5 and 6 the high frequency generators are connected in series instead of being bridged across the line wires of the system. An arrangement for multiplex high frequency telegraphy is indicated in Fig. 7. Fig. 8 shows the simultaneous use of telephone and telegraph on the same circuit by the Squier system. The ordinary telephone sets being shown by B and B'. Fig. 9 shows the use of the Duddell arc as a source of high frequency oscillation. This method was employed with some success by Major Squier, but he has found preferable a special high frequency generator, which was constructed to suit the needs of his system by the General Electric Company. This machine delivers two kilowatts at a frequency of a hundred thousand cycles per second. The rotor is about twelve inches in diameter and runs at the enormous speed of twenty thousand revolutions per minute. An approximately true sine wave is wave is produced by this machine.

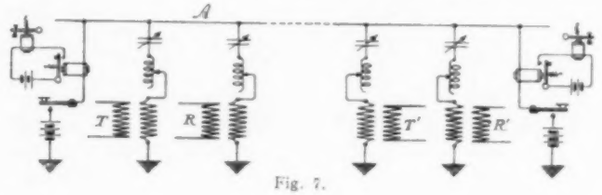


Fig. 7.

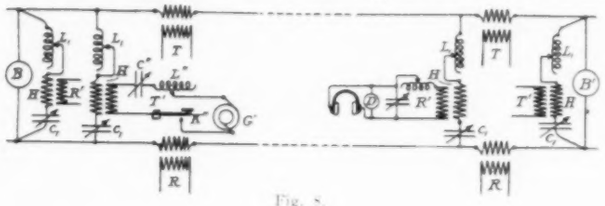


Fig. 8.

Major George O. Squier of the Signal Corps, the inventor of the system, for years has been a student of electrical science and has made numerous valuable inventions for the use of the Signal Corps.

Major Squier four months ago began his tests over a system of wires belonging to the Chesapeake and Potomac Telephone Company, running between the construction laboratory of the Signal Corps, located in a building on Pennsylvania avenue, Washington, D. C., and one of the laboratory buildings of the Bureau of Standards, where the Signal Corps has a laboratory. Experiments were made with many sets of apparatus until a trial was made of the ordinary wireless equipment and successful demonstration of the discovery was attained.

Major Squier believes that general use will soon be made of his discovery by private individuals and by telephone companies. He expects that one result will be a general reduction of the cost of telephone service and possibly its more widespread distributed use. The machine is regarded as of special value for long distances. It gives a clear and audible tone and will probably be first applied in that direction by the companies which adopt it.

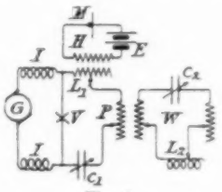


Fig. 9.

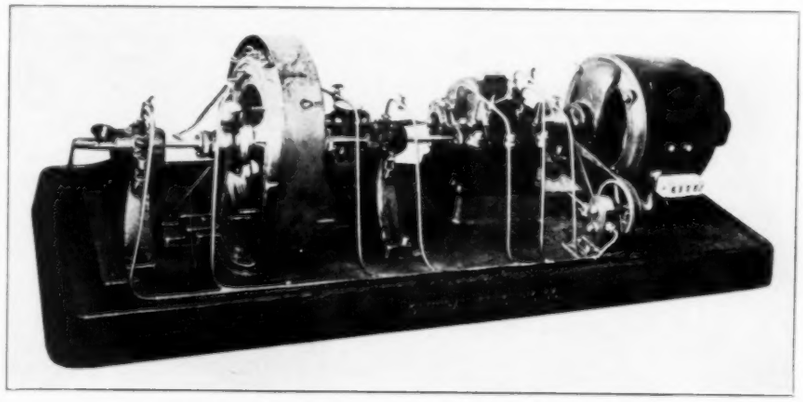
The experiments between the construction laboratory of the Signal Corps and the laboratory of the Bureau of Standards were witnessed by many scientists. One feature of the new telephone is its success in transmitting music over the wires. The strains of a band, violin, or of an organ are distinctly heard. It is believed that long-distance transmission of opera music, sermons, and lectures is possible by the multiplex telephone.

The whole matter has been guarded with great secrecy. Until the patents issued January 3 no one outside of the Signal Corps and one or two high-placed officers knew what was being done.

The new system of multiplex telephony, it is said, may be applied to all local telephone exchanges without any modification of the present installation, and could conduct a telephone system without the use of two wires, as now.

The superposition of numerous conversations on one wire will not in any way interfere with the present use of the telephone by the apparatus now in use. The multiplex may be used with one wire or two, and can be accommodated to the simplest or the most complex installation.

No steps have yet been taken to apply the new system for army use. It will duly


High Frequency Generator for Multiplex Telephony.
Delivering 100,000 Cycles Alternating Current at a Speed of 20,000 Revolutions per Minute.

be employed in the field in various parts of the country and in Alaska, Hawaii, and the Philippines.

Major Squier is a Michigan man, who was graduated from West Point in 1887. He has been a student of various branches of science in his army career and has earned a degree from the Johns Hopkins University. In May 1898 he became a captain in the Signal Corps and served through the Spanish war and for several years in the Philippines. For the past three years he has been stationed in Washington as assistant to the chief signal officer of the army.

New York Commission News

The New York Public Service Commission, Second District, has notified all telephone corporations within its jurisdiction that the practice of offering trial service installations is regarded by the commisson as unlawful, and that the company engaging the same is subject to the forfeiture and penalties prescribed by the Public Service Commission law. It has been brought to the attention of the commission that certain telephone corporations have heretofore been in the habit of making what is called trial service installations and now it is desired that such installations be discontinued. Also that some corporations have been since September 1, and are now, making such trial service installations. Such trial installations clearly give the new subscriber free service from a telephone corporation during a certain period of time, in many cases as long as six months. The commission calls attention to the requirement of the Public Service Commission law that no telegraph corporation or telephone corporation subject to the provisions of law shall directly or indirectly give any free or reduced service, or any free pass or frank for the transmsision of messages between points in the state, except to its officers, employees, agents, pensioners, surgeons, physicians, attorneys-at-law and their families, or to persons or corporations exclusively engaged in charitable and eleemosynary work, and ministers of religions, officers and employees of other telegraph corporation and telephone corporation and street railroad corporations, and for the further provision that no telephone corporation shall directly or indirectly or by any special rate, rebate, drawback or other device or method, charge, demand, collect or receive from any person or corporation, a greater or less compensation for any service rendered or to be rendered, than it charges or receives from any other person or corporation for doing a like and contemporaneous service.

The Public Service Commission, Second District, has received a complaint from Major General F. D. Grant, Commanding Department of the East, U. S. A., asking the commission to require the New York Telephone company to furnish trunk line service to be connected with the Post telephone switchboard installed by the government. General Grant states that the company has heretofore declined to grant the connection with such service on the ground that their regulations will not allow them to permit foreign instruments to be used on their lines. General Grant says that for administration purposes at military posts the signal corps of the army installs telephones of the latest pattern and switchboards which can be used for post inter-communication only, but cannot be used in the furnishing of communication with commercial firms in view of the prohibition referred to. He believes that since the equipment furnished by the signal corps is standard and would not interfere in any way with the proper workings of a commercial system, it certainly would give greater facilities at army posts for the transaction of official business if the telephone company were directed to furnish the connection with post line service only to post telephone switchboards on military reservations, the government to furnish all other equipment necessary in the operation of the service on the reservation. The service especially desired is at Fort Wadsworth, Staten Island.

Telephones in China

Consul-General Samuel S. Knabenshue, Tientsin, says an American, just from Peking, informed him that a member of the Yu Ch'uan Pu (Board of Communications), which controls the telephone system, expressed himself enthusiastically in favor of telephone extension in China, and said that he believed that every city of sufficient magnitude within the empire would possess telephone facilities within a very few years. It need hardly be suggested that American manufacturers who are not already in touch with the Board of Communications should send representatives to Peking.

Mr. Knabenshue is strongly impressed with the possibilities of the market for telephones in north China. The first electrical apparatus which attracted the Chinese seems to have been electrical toys of various kinds; now, however, they realize that electricity is an extremely useful force, and are ready to consider its application wherever possible. A dealer in general supplies in Tientsin keeps a number of pieces of electrical apparatus to interest Chinese of the better class who call on other business, and finds it a great aid in many instances, such is their interest in electrical apparatus.

The head of a trading company of Tientsin says that if an agency is appointed for electrical supplies for all of north China his company would be glad to consider an offer to take it.

Telephone Dry Cells in Australia

Consul John F. Jewell, Melbourne, states that the demand for dry-cell batteries in Australia is supplied by Denmark, United States, Germany, England, and one Australian factory. The largest user of these batteries is the government telephone department, which controls the telephone system of Australia. The annual requirements of that department are about 30,000, purchased by public tenders or bids, with a strong preference in favor of the Australian article, at higher prices, for the encouragement of local industries. Among the last contracts were one at 52 cents each for a Danish, and another at 58 cents for an Australian product. No figures are available as to the quantity imported annually into Australia. The addition of 30,000 for private users to the 30,000 taken by the telephone department, of which probably 20,000 are locally made, would form a fairly reliable estimate of the annual consumption.

The field is not a large one, though it is a growing one for the time being, but will be checked in a few years, as far as the telephone department is concerned, as the common battery system is shortly to be installed and gradually used throughout the service.

Who's Who in the Telephone Game

Facts and Fancies About a Man You Know or Ought to Know

NOW that many of you have gathered around here again, and are calm and comfortable, you will be introduced to the man who manages the Chicago Telephone Company—number of subscribers today, 242,387, or thereabouts—and not a ripple of excitement in the whole system; at least, comparatively no trouble at all since the riot was quelled at Sixty-fifth and Howard. And in passing, you are reminded that the management of a concern like Chicago Telephone is one of the niftiest occupations that you will meet with this side of New York. There is only one man for such a job, and whether the telephone is or is not a natural monopoly this man has his job massaged, manacled and monopolized and eating out of his hand. There has been no extra work for a sign-writer on A. S. Hibbard's office door for eighteen long years and there is no immediate prospect for a change.

In Business He Is General Manager and out of Business He Is General Musician.

Angus Smith Hibbard is a rollicking fifty-year-old. He gets more fun out of living than any one of a hundred men you can name. It must be traceable to his enthusiasm. His devotion to his work and his associates is the key-note to his tremendous success. And yet, to meet this man face to face, you would never guess that he had any responsibility. Occupation rests lightly on his shoulders. Had the pranks of a college fraternity included the tattooing of G. M. on his back, there might have been better reason that Hibbard was destined for an executive, but not having met such fate it must be due to nature, because Mr. Hibbard has had an almost uninterrupted experience in administrative affairs. He started his active career in telephone work as superintendent of the Wisconsin Telephone Company. Having been born in Milwaukee you will understand why. His peculiar fitness for the position got him recognition from the American Telephone & Telegraph Company and in 1886 he was transferred to New York, where he became general superintendent. Seven years later, when he was thirty-three, he came back to Chicago and nailed down the job which still engages his attention.

You ought to be ready to acknowledge that this is a snippy little tale of a conspicuous, though not corpulent, corporation manager, but it has been confined strictly to telephone activities. Prior to his advent into the telephone business, Mr. Hibbard was secretary to the superintendent of the Northwestern Telegraph Company, also of Milwaukee, and before that he was employed by the Chicago, Milwaukee & St. Paul Railway. He went to school at the old Milwaukee Academy and finished his education at Racine College.

Angus S. Hibbard, vice-president, general manager and director of the Chicago Telephone Company, has invented and patented a number of devices that are used in telephone systems. He was first to extensively introduce the lamp signal now characteristic of all common battery switchboards. The mechanical department of his company is his special delight because of his own fondness for mechanics. To mention music and mechanics in the same breath may be suggestive of the anvil chorus, but it doesn't apply here, for Hibbard is a musician as well as a mechanic and manager. As a composer of civic songs he has no superior. He is composer of many songs that are sung in Chicago's schools, clubs and societies and the large civic bodies of Chicago have long since refused to use anything but the genuine Hibbard brand.

Without discounting his popularity as g. m. of his company, he is idolized by his associates in club life. In business he is general manager and out of business he is general musician. He is a member of the University, the Union League, the Industrial and the Glen View clubs. He is an honorary member and for seven years was the president of the Apollo Musical Club. Also he belongs to the Chicago Association of Commerce, and the Wisconsin Society of Chicago—of which he is president—and the American Institute of Electrical Engineers.

Mr. Hibbard was born at Milwaukee February 7, 1860. His father was William B. and his mother Adaline (Smith) Hibbard. Angus Smith Hibbard was married December 3, 1884, to Lucille Ray, a daughter of Charles Ray, of Milwaukee, proprietor of the *Milwaukee Sentinel*. He has one daughter, Janet Hibbard, wife of George F. Henneberry. The

Janet Hibbard, wife of George F. Henneberry. The Malwaukee *Sentinel* is thereby subsidized and Henneberry gets the job printing. The families live on East Elm street in Chicago during the winter, and out in Glen View during the summer, where Mr. Hibbard plays golf.

So there you have it. Remember that enthusiasm and energy have marked the course of George Angus Hibbard—smooth, lovable, companionable—who is never ruffled in his address before a body of Chicago's finest, or the ball that lies there at the heel of his driver.

Rate Discussions in Chicago

A report made by experts employed by the city of Chicago with regard to the Chicago Telephone Company has just been published:

In 1905 the franchise of the Chicago Telephone Company was about to expire and it made application for a renewal. The board of aldermen appointed a commission consisting of Prof. D. C. Jackson, William H. Crumb and Dr. G. W. Wilder, electrical engineers, to investigate. They made a report, upon which the aldermen made reductions varying from 18 percent on some classes of service to as high as 66 2-3 percent on others.

The telephone company protested that it could not make money on its investment at these rates, but the aldermen were obdurate, and the company went ahead with its business on the understanding that a more thorough examination should be made by experts, and if it was found that the company's allegations were true that the rates would not pay, then they should be raised

This second examination went on through a couple of years, at the end of which the experts figured that the company had sustained a loss of $908,533.52 per annum.

Not satisfied with this finding, the committee on gas, oil and electric light, of the board of aldermen, determined on a still more minute examination, and they employed William J. Hagenah to make it. This report has just been rendered, and it shows a startling divergence from that of the previous report.

Some of the findings of Mr. Hagenah are: That the Chicago Telephone Company is not entitled to an advance in rates; that so far from there being a deficit of more than $900,000, there is actually a surplus of $429,329.47; that 5 1-2 percent is an adequqate annual charge for depreciation on its plant; that the plant is overvalued by the company $1,584,135, and that the company is paying the American Telephone & Telegraph Company, the owner of the alleged patents, $355,711 per year for rental of instruments, etc.., which are only worth $208,300.

The committee has ordered W. J. Hagenah to prepare a new schedule based on the committee's decision to adopt his report with an addition of $60,000—which is the company's income from toll service—to the surplus found by him.

President B. E. Sunny of the telephone company says:

"There is not a chance of our company adopting reduced rates. We are operating on an absolute minimum margin and any reduction would nearly ruin the company.

"Mr. Hagenah's report covers the operation of the telephone company in Chicago for the calendar year 1909.

"It shrinks the value of the telephone company's property in Chicago $4,600,000 by an assumption of what it would cost to duplicate the property at this time and because of alleged depreciation, although Mr. Hagenah in several places in his report testifies to the fact that the property has been well maintained and is in first class condition.

"After an allowance of 8 percent on the value so reduced and 5 1-2 percent for depreciation the committee finds that there was a surplus in the net earnings for the year 1909 of $216,000.

"Both Mr. Hagenah and the committee agreed that there was an item of $40,000 included in the $216,000, which required further investigation, and the telephone company confidently believes that this item will be stricken out, leaving the surplus at $176,000.

"The purpose of the investigation is to fix the rates for five years from this time. Therefore the instructions of the committee to Mr. Hagenah to reduce rates to the extent which would absorb the 216,000 or the $176,000, whichever amount is found to be the true surplus on the basis of the report, mean that if the experience each year for the next five years is the same as for 1909 the company would close each year without a dollar in the treasury in excess of the cost of operation, interest and depreciation.

"The committee, in its instructions to so reduce rates, totally disregarded the claims of the telephone company for allowances for the following important items:

"In the present telephone ordinance the telephone company is required, in the event of the building of a passenger subway, to remove its cables and conduits out of the way of such construction at its own expense, and as nearly as the telephone company can estimate the cost will be $600,000 for five years, which will be an additional tax on the telephone using public, in the interest of the owners of the passenger subway, whether it be the city or a private corporation.

"The present telephone ordinance requires the telephone company to install on measure service telephones, telephone meters, notwithstanding almost all of the measured service lines are now equipped with meters at the general office, and the added operating expense of said meters will be from $50,000 to $400,000 a year, according to the number of meters installed, and without any addition to the telephone revenue whatever.

"In the valuation of the plant the committee has allowed no valuation whatever as a 'going concern,' which item has been generally recognized by the courts as an important factor in valuing the property of a corporation of the kind.

"The committee has given no consideration to the fact that 'required reconstruction' has to a large extent taken the place of depreciation, so that the plant, instead of being 77 1-2 percent new, as claimed by Mr. Hagenah, is between 85 and 90 percent new.

"The telephone company points out that if its rates are to be regulated by competition it is an unusual and an unheard of thing that they should be likewise regulated by the municipality. Municipal regulation necessarily means the exclusive right to conduct that class of service.

"The telephone company claims that the committee must take into account the effect of competition on the revenue of the telephone company."

Consul-General Edward D. Winslow writes from Stockholm that the Swedish Telephone Company has secured an order in Cape Town, South Africa, for 50,000 instruments valued at nearly $100,000.

Digest of Foreign Telephone Literature

Translated for Our Readers

IMPROVING DRY CELLS.

THE life of a LeClanche type can be lengthened about 25 per cent by adding from 10 to 20 per cent manganese chlorate to the manganese oxide which is used for depolarization. As such elements generate gases which would make them unfit in this form for dry cells, the following was tried and found successful. After the two electrodes had been placed in the cell, the cell was filled with the electrolyte solution and after cooling covered with a thin layer of sawdust saturated with some fatty substance, usually paraffine. The sawdust layer allows gases to escape but not the electrolyzing solution. The entire cell is covered with a layer of sealing wax perforated with numerous holes. —*La Revue Electrique.*

USE OF TELEPHONE FOR DIVINING ROD AND PIPE BREAK INDICATOR.

Some time ago tests were made in Paris with an apparatus to discover subterranean water veins and streams. A sensitive microphone with a receiver at the other end makes subterranean noises very plain to the ear. Flowing water was audible by a roaring noise; even falling drops of water could be heard with this sensitive instrument. A Frenchman, Daguine, uses a so-called water-telephone, whose transmitter is buried in the ground and the receiver held against the ear. This device is said to have discovered the flow of subterranean waters for a distance of over three hundred feet. Munoz, a Spanish engineer, in 1909, invented a telephone divining rod which discovers the electric influence of subterranean waters as also their depth and extent. This recalls the well-known Herring telephone, which John Eggen, a Norwegian, patented. In this case the water served as a current conductor between a microphone and a metal plate. There is a transmitter equipped with a microphone, which is connected to a storage battery on board ship, and a receiver which is connected between the battery and a metal plate. Both the metal plate and the transmitter are lowered into the water and any shoals of herring or other fish which disturb the sea are announced by the receiver on the ship through the submarine microphone.

This instrument has also been used to give notice of the approach of ships in foggy weather. In this case a microphone is attached to the ship's side below the water line and the sound waves transmitted to the receiver on board. If the telephone is to be used to discover breaks in water mains, a wooden shaft with a metal point on its lower side, and a fine point touching a steel diaphragm on its upper side, is placed on any part of the pipe, and a receiver connected to this diaphragm. A small battery furnishes the necessary current. The rush of water and the sound of escaping water is easily heard by the aid of the telephone and a leak is easily located.—*Gesundheits Ingenieur.*

TELEVISION BY CATHODE RAYS.

Usually in transmitting pictures by this method a cathode pencil of rays is used and divided by a perforated diaphragm in such a manner that only a thin ray emerges. A pencil at the transmitting apparatus sends current components into four electromagnets which influence light rays so that they make the same movements as the pencil. The rays act on some sensitive body like fluorspar, and the image of the picture appears to the eye of the observer in form of light waves.

Recently an improvement on this device was worked out. A small dynamo and voltage regulator are used. The latter is regulated in such a way that the current generated excites electromagnets so that they cause the ray of light to make continuous upward and downward movements, each one accompanied by a slight sideward motion. In this way the ray covers a space of one square inch in 0.1 second. Each light impression on the eye remains in that organ a little longer time than the duration of the original impulse which struck the eye. As the impression of the first ray is still in the eye when the second ray makes its appearance, and so on, we get the impression of a continuous picture, the unit being made up of the different light impulses. The transmitter in this apparatus has also a square, one inch each way, which is touched over the entire area by small metal brushes whose movement is synchronous with that of the receiving square. The entire surface is covered in 0.1 second. A battery is connected with the metal brushes and then over the line with two deflecting electromagnets, which have the following effect: The image to be transmitted to the receiving station is placed at the front of the transmitting square and connected with the clamps of its electromagnets. The brushes touch progressively every point of the object and close at each touch the line current which excites the electromagnets. These deflect the cathode ray from the diaphragm so that the light spot on the lighted surface disappears at each closing of the circuit. That is, each time that contact takes place at the transmitting station between brushes and object, all those spots remain dark in the receiver, which correspond to the contact space in the transmitter square. The shadow picture of the object appears therefore on the light surface of the square. As the light covers the entire one-inch square in 0.1 second, and then repeats the operation, the shadow of the object in the receiving square follows all the movements of the object in the transmitting square accurately and continuously. The generation of a point of light takes only 0.0002 second, which is the shortest time yet reached in the generation of a ray of light. In this way, since the first light impression has not left the eye before the second appears, we get the impression of a continuous picture.—*Zeitschrift für Schwachstromtechnik.*

NEW RAILWAY TELEPHONE EXCHANGE AT FRANKFURT A. MAIN.

The telephone exchange at the Frankfurt a. Main railway station takes care not only of the railway service but also of the official telephone service and private subscribers. Central battery system with automatic lamp call and clearing signals is used. The switchboard in the main exchange has space for six official post office main lines with all telephones and private exchanges. It connects to 30 sub-exchanges,

220 railway telephones, the freight yards, railway terminal offices and private lines. To enable telephoning from private offices with other telephones which are either of a private nature or so busy that they are hard to call, automatic push button intercommunicating switches are installed on these telephones Besides this there are the regular connections with the main switchboard, so that all long distance calls can be made from them as well. Although all telephones are arranged so that they ring as soon as the receiver is removed from the hook, and inductors in such cases are unnecessary, still they are attached to all telephones. This enables the subscriber to repeat his call signal independently of the exchange operator, in case the latter is busy and the call is not answered immediately Another problem to be solved was that of treating lines connecting to the main exchange, where several telephones are connected in series or parallel, and which communicate with each other by special private call signals. As it would lead to confusion if call signals between the various telephones were to appear at the main exchange switchboard, a small switchboard and a two-place switch are installed at each telephone, equipped with alternating current calling system and condenser.

The main switchboard in the railway terminal is a call switchboard with automatic call and clearing signals. The switchboard has an iron framework with oak panels. There are six rows of jack panels easily reached from the operator's seat. In the center of the board are the call and clearing lamps of subscribers' lines, the call keys, and sub-station call keys. The sub-station connecting jacks are covered jacks with cordless connecting plugs. Below the sub-station connecting jacks are the private line jacks, the call and busy wire lamps, and sub-station lines. The rest of the switchboard is taken up by the jacks and lamp signals for about 220 lines. Above each lamp is the number of the line, which lights up when a call is desired. In the lower part of the switchboard face is the large red call-control lamp and for each of the operators a large pilot lamp. The former lights up by means of its relay when the inductor or ringer (calling machine) sends alternating current into the line to be called, and shows the correct passing of current. The two pilot lamps, which light up each time any call line lights up, are to attract attention to any call in case the ordinary line lamps are not noticed by the operator. They also indicate the burning out of some of the line lamps if the pilot lamp lights without the corresponding light in the line lamps. The relays, fuses and intermediate distributing racks are in a special board. This has two advantages; first it limits the size of the switchboard within, and second, enables easy repairing and inspection in case of trouble without disturbing the operators. Each of the single and two-spool relays, the latter with differential action, is protected against dust and injury by a special protective cap. The rest of the relay rack is occupied by safety fuses for each group of ten lamps, the terminals for intermediate distributing lines, and the feed wire connections The feed cables at entrance into the switchboard are divided and then conducted further in single strands to the different screw clamps, enabling cutting off troublesome lines without much difficulty. Between the two switchboard panels is a small marble slab with instruments for observing the storage battery. Below this is the ringing pole changer, which does not operate continuously, but only when the corresponding calling key at the switchboard is pressed down. The current of this instrument is always uniformly strong and reliable, and it uses little current, even if it were to work continuously, which is not the case.

The storage battery has six calls of 73 ampere hour capacity, and gives current for live lamps and microphones at twelve volts. A second storage battery takes up the work of supplying current while the first one is recharged.

Most of the telephones in the railway offices are either desk or wall telephones, and most of them have one or more switches to connect with other offices without first calling the main exchange. To make calls audible, even if the person called is not in the room, each of the telephones is equipped with two or more buzzers, whose annunciating discs drop and buzz, and spring back into rest position automatically as soon as the call is answered and receiver hung up again. All telephone cables are laid in flat wooden boxes with hinged cover, so that the rubber and cotton insulated wires can be inspected without trouble. Only where moisture or fire danger prohibited such a course was lead-covered iron pipe used for conduits. —*Zeitschrift für Schwachstromtechnik.*

SIMPLIFIED COMPUTATION OF GREATEST SAG OF OVERHEAD WIRES.

The determination of unfavorable stresses and the greatest sag of overhead telephone and telegraph wires, according to German standards, necessitates double computation. Weil gives a simplified computation process which simplifies the computation. He gives the following formula:

$$\frac{1}{24}\left(\frac{p^2}{R^2}-\frac{po^2}{Ro^2}\right)\times^2=(t-to)\,d-(R_o-R_1)\,a$$

Here p is the geometric resultant of the dead load of wire and additional snow or ice load.

t is the temperature in degrees centigrade.

f is the sag of wire.

l is the length of wire between two poles.

R is the stress in kg/cm² in any load.

p_o, R_o, t_o, f_o, l_o correspond to a certain load which is to serve as final point in this computation.

d is the heat expansion co-efficient for every 1° C.

a is the elongation of wire in cm²/kg.

Required to solve the following: When does the maximum stress at —5° C. and ice load of 0.015 kg. per cm² (wire cross section and linear wire) appear, and when does it appear at —20° C. without additional external load. We must find out under what conditions stress on wire at —20° C. without additional load reaches the value (R_o), to which value it had been exposed at maximum additional load and at —5° C.

$$\text{This gives the span } = X_r = Rmax\sqrt{\frac{to-ti}{24d\ P^2\ max-p^2}}$$

or with a definite material for wire

$$X_r = Rmax\sqrt{\frac{12000\ d}{0.0075+\text{dead load of wire}}}$$

For all spans below the maximum stress enters in at lowest temperature, while for greater spans in practice at —5° C. and maximum additional load it is to be computed with the maximum load as a factor of computation. Some of the common wire materials were

computed by these formulas and gave the following results:

	deadload of wire kg/cm³	d computed at 1° c.	a cm²/kg	XR in meters Rmax in kg/mm²
Copper....	8.9 ×10⁻³	1.7 ×10⁻⁵	1⅓×10⁶	×R=3.53 Rma×
Bronze (7000 kg/cm)	8.65×10⁻³	1.66×10⁻⁵	1⅓×10⁶	×R=3.51 " "
Aluminum	2.75×10⁻³	2.3 ×10⁻⁵	1/0.715×10⁶	×R=5.20 " "
Steel.....	7.95×10⁻³	1.1 ×10⁻⁵	½.2×10⁶	×R=2.92 " "
Iron (4000 kg/cm)	7.79×10⁻³	1.23×10⁻⁵	1/1.9×10⁶	×R=31.0 " "

which gives for copper:

at Rma×= 4 8 10 12 14 16 18 =kg/qumm
at ×R =14.1 28.2 42.4 49.5 56.5 63.6 70.7= meter

and for aluminum

at Rmax = 6 — 9 = kg/qumm
at ×R = 31.2 — 46.7 = meter

The second question is: When does the greatest sag at —5° C. and known additional load, and at +40° C. without additional load, take place?

It is to be computed at what temperature *tf*, the wire loaded by its own dead load, has the same sag as when loaded with additional maximum load, *Pmax* and at —5° C. We get the formula.

$$tf = to + \frac{a}{d}\left(1 - \frac{P}{Po}\right) Ro$$

Usually *Ro*=*Rmax*, and *P* =dead load of wire.

This leads to the conclusion that at temperature t^0 the load p^0 and stress *Rmax*, the sag for all spans at the same temperature *tf* is reached again when additional load has sunk down to *p*. If *tf* is exactly equal to *tmax*, =40° C., then load becomes

$$R^1 max = \frac{d}{a}\left(t\,max = to\right)\frac{P_o}{P_o - P_1}$$

or according to standard specifications,

$$R^1\,max = 45\,\frac{d}{a}\left(\frac{dead\ load\ of\ wire}{0.015} + 1\right)$$

If *tf* is <*tmax*, then the greatest sag appears at *tmax*; if *tf* is >*tmax*, it appears at —5° C and the ice load.—*Elektotechnik u. Maschinenbau.*

U. S. Patent Office Models in Danger

An effort to scatter the many thousand patent models now in the keeping of the patent office failed in the last fifteen minutes of a recent session of the house while the legislative, executive and judicial appropriation bill was under consideration.

Representative Bennet, of New York, noticed a paragraph in the bill providing that the superintendent of the capitol building and grounds within sixty days should sell at auction all of the patent office models now stored in the basement of the house office building. Mr. Bennet thought the thing looked suspicious. He called up the commissioner of patents and asked if it was his wish that the models were to be scattered.

Mr. Moore replied that for several years he had been most emphatic in protesting against suggestions coming from the house appropriations committee that the models should be got rid of in some way. Mr. Bennet and others of the New York delegation determined that the paragraph should go out of the bill. When it came up Mr. Driscoll was on the watch and made the point of order that the paragraph was new legislation. Mr. Currier, of New Hampshire, in the chair, asked Mr. Gillett, who was in charge of the bill, if he desired to be heard on the matter.

"I do not," replied Mr. Gillett, with decided promptness, and the paragraph went out.

This is not the first time the attempt has been made to destroy the collection of patent models which forms a very important part of the records of the patent office. Two years ago a similar move was made to get rid of them, and was thwarted in the senate committee on appropriations. The excuse that the room they took up in the Interior Department was badly needed was answered by finding a place to store them in the subterranean passage of the house office building, leading to the subway running over to the capitol. Elliott Woods, the superintendent in charge of the building, has found the arrangement entirely satisfactory to him, and the models, all classified and boxed up, 134,000 of them in all, are safely kept there.

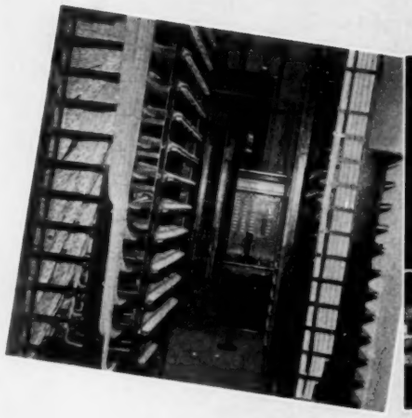
It is not known who placed in the bill the paragraph providing for the sale of the models. None of the clerks connected with the committee can remember whence it came. None of the sub-committee that prepared the bill can remember who proposed the thing. It is only known that Mr. Tawney formerly was strenuous in holding that the models had no value.

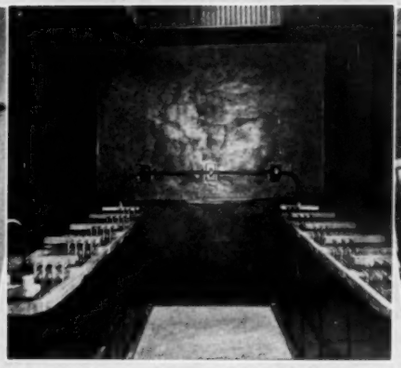
That large interests might be greatly benefited by the destruction of these models is known. For instance, the Department of Justice is preparing its case against the "electric trust," and its defense is expected to lie mainly on patents granted from time to time. Many features of these are believed to be in the models. In fact, basic ideas of important patents on which immense values in business rest, are illustrated in these models.

Mr. Tawney has said that the models are boxed up and never looked at, and should be made away with. To this the commissioner of patents replies that he is required by orders from various courts during the year to send out several hundred of these models as evidence in contested patent cases.

"There is no doubt," said a prominent official of the government, "that there are concerns that would be glad to get hold of these models. I know of my own experience in patent law. There are several large trusts right now that would pay a good many thousand dollars to be able legally to destroy certain models. There are in the many thousands of models stored in the office buliding all the basic inventions for telegraph, telephone, electric propulsion, and all manner of electric discoveries both in the principal ideas and in modifications and adaptations and improvements.

"There are thousands of basic patents of which the only good evidence is in these models. You can easily see that if they were destroyed not only would many alleged new inventions have a better chance to get through, but contests against concerns claiming exclusive ownership of patent rights would be deprived of the best evidence as to the original invention."





Toll Switchboard.
Rear View of Local Board.
Distributing Frames.

Terminal Room.
Telephone Building at Brownwood, Texas.
Battery Room.

Local Subscribers' Board.
Rear View of Toll Board.
Relay Rack and Terminal Room.

Views of the Brownwood Exchange of the West Texas Telephone Company.

Reconstruction at Brownwood, Texas

When the disastrous fire of June, 1909, occurred in the Brownwood exchange of the West Texas Telephone Company a few records were broken in getting an emergency switchboard in place and restoring the interrupted telephone service to that busy little community. An equipment of eight sections was made ready within a very few days after the destruction of the former central office equipment and preparations were at once begun for a new, more complete and permanent outfit.

Brownwood is now receiving telephone service over a switchboard which boasts of all of the newest and most improved appliances. This was cut into service during the past year and is the equipment which is illustrated in the photographs presented here.

The new exchange is capable of accommodating the growth of the Brownwood telephone business for some time to come. It is of the Western Electric No. 1 central battery type and consists of the following details:

Three 6-panel, 3-operator position, subscriber sections.
Three 5-panel, 2-operator position, toll sections.
One wire chief's desk.
One chief operator's desk.
One subscribers' main distributing frame
One toll main distributing frame.
One intermediate distributing frame
One relay rack.
One coil rack.
One fuse board.
One power plant.

Nine operators are intended to take care of the local subscribers' equipment. Of these, one handles the testing position, one is designed "Special," one the switching to and from rural lines, and one position is at present blank. The subscribers' switchboard, with an ultimate capacity of 3,000 lines, is at present equipped for 1,040.

There are 40 outgoing trunk lines from this board, the ultimate capacity being no less than 240. It is further equipped with 40 local trunks and 6 local trunks to the rural operator. The board has a capacity of 10 local trunks to the rural operator.

With a capacity of 300 multiple toll lines the toll switchboards is equipped for 40 lines. It is possible to increase this equipment eventually to five sections. Three sections, as has been noted, are now in use. Five operators handle the toll lines and one the recording position.

In the terminal room are located the main and intermediate distributing frames. Also in this room are racks to accommodate the line and cut-off relays. These relays are protected with dust-proof metal covers. When the covers are removed the relays become readily accessible.

The detail of the complete power plant in the Brownwood exchange is as follows: Power protection panel, power board, rectifier equipment, battery panel, storage battery equipment, power wire and miscellaneous equipment.

A mercury arc rectifier is used for charging eleven cells of storage battery at about 30 volts direct current, from 110 volts, 60 cycle, single phase alternating current. The rectifier equipment further consists of a 3-kilowatt transformer and a reactance coil.

The central figure in our group of photographs shows the handsome new exchange building of the West Texas Telephone Company at Brownwood. The interior of the building is fully in accord with the appearance of its exterior and the departments are laid out with a view to efficiency and system. The reception room, local manager's office and terminal room are located on the main floor as well as are the public booths and storage vaults. The general manager's and auditor's offices and operating room are on the second floor, together with the operators' rest room.

Interior block distribution takes care of the distributing system in the business section of the city, 1,200 pair cables being used, and the poles in the residence section are limited to one or two cross-arms. The cable leads are calculated to provide for four years of growth, and the lateral taps are intended to accommodate the ultimate capacity of the exchange.

The company held a public reception October 7, when the new equipment was put into service, and the working of the exchange system was explained to the subscribers and prospects of the company. It is stated that this has had a very salutary effect on the treatment the company is receiving at the hands of its subscribers.

The West Texas Telephone Company has its general offices in Brownwood and operates exchanges in that city, Coleman, Balinger, Winters and Goldwaite. The systems at Brownwood and Coleman are common battery while those at Ballinger, Winters and Goldwaite are magneto system. In all the company operates over 2,800 instruments and controls about 700 miles of pole lines.

The officers of the company are J. A. Walker, president, G. N. Harrison, vice-president, and W. T. Stromeyer, secretary-treasurer and general manager. The company plans to an expenditure for next year of about $100,000 in toll line extension and new small exchanges, and is rapidly developing the field in which it operates.

The Brownwood exchange is an interesting example of the small operating company which realizes the value of efficiency of equipment.

Consul-General Herman R. Dietrich, Guayaquil, says that Riobamba, Ambato, and Latacunga now have telephone stations, put in by the long-distance company, which will have its line completed in a very short time between Guayaquil and Quito. The government telephone lines run into Cuenca, Loja, Bahia de Caraquez, Manta, and Esmeraldes. There are no statistics to be had in regard to wire mileage, but the mileage will be increased 1,200 miles by the wire put in by the long-distance telephone company.

The Guayaquil Telephone Company expects to increase its capital stock from $125,000 to $250,000, and with this increased capital put in a common battery system with complete modern appliances. A British telephone company in Guayaquil is capitalized at $125,000. The subscription rate of the various companies is $2.50 per month, for use or rental of telephones.

What One Woman Thinks

By Sarah Elizabeth Brown

IT may be all right for the men, but it is pretty tough on the women to change a convention date. Ordinarily, a woman doesn't travel enough to have an outfit ready to grab and run. Now, my mind was concentrated on a convention for January. It had been that way for some time and I had been planning for the event. I was going to Chicago and you will understand that I do not go to the windy city every day. My extra sewing and fixing was mostly done when the notice came, but the date has been changed. Women's fashions are comparatively stable when the period contemplates no more than three weeks, but I am out of patience already with my new transformation and I guess I'll have to stick to my old rats and puffs. Dear, oh dear! you men are lucky with just your coats and pants.

The worst of it is I was going to the convention in January and now I am not going in February. In fact I will not be able to go at all. I suppose it won't make a bit of difference, but there seems to be so much mystery about those postponed dates that my pent up curiosity is beginning to hurt me. I'm sure Obediah won't get half the story without me along to ask him questions. At any rate if the operators get together I know that the independents will insist upon a fair deal if there are enough of Obediah's kind at the La Salle Hotel. I'm sure there will be a big attendance of very earnest men who have been trained to know what the public wants in telephone service and how best to give the people what they want. The men who will attend the convention this year will be the same men who have attended it in past years. It won't be any place for boys! If the operators of independent systems are to listen to a report from the president of the National Association, which is sure to advocate physical connection under regulation, then there must be much evidence of the rule to govern. And if Mr. Woods will have a plan of the opposing forces to submit it will have to be so free from complications that all may know by an approved nod and no discussion. The veterans of independent telephony haven't grown whiskers to disguise their intelligence. They wear them to emphasize it. They are coming to the convention to reason and act upon any sane plan that will promote a better means of serving themselves. To serve themselves, they are always thinking of the people they must serve. They put in three hundred and sixty-five days a year doing that and they enjoy it. Telephone men are a joyous lot. The sweet peace of all telephone men is due largely to the kind of apparatus with which they deal. Intricate as it is, abused as it must be in the public's hand, show me anything else that is so efficient. If competition is responsible for the approved devices which enter into telephone plants, then let us give praise to competition.

* * *

I have learned that you cannot interfere with holiday festivities by talking telephone business. When John came back from Cleveland, the subject of the telephone passed out of my mind entirely. He was so thoroughly imbued with his work there and had so many engagements at home that it was practically impossible to say anything to him on any subject. I didn't realize this until he had returned to Ohio, and then I woke up to the fact that he had not given me any information about the "situation." Now that he has left me I find very little solace in the newspaper reports. Newspapers are such unsatisfactory things to read. When I wade through a lot of stuff in the columns of my favorite periodicals I always imagine that the writers are paid in accordance with the amount of space it takes to tell the story. I have mulled through column after column, which purports to say that there will be a consolidation of the independent telephone system of the United States into one great corporation that will out-rival the American T. & T. Company and that this monstrous independent corporation will be dominated by J. P. Morgan. I have given expression to my own belief that such a plan would be inoperative and I am not ready to change my opinion. With more than a decade and a half of experience, the American T. & T. Company found itself unable to cope with the telephone problems upon a monopoly basis and a concern which knows no more about the telephone business than the banking house of J. P. Morgan & Company can hardly expect to rival the American T. & T. on fifteen minutes' notice. I am in sympathy with any movement which will tend to make the operators' position stronger, and I hope as a result of the many conferences that are being held in New York between the independent and the Morgan interests that something will develop which is truly worth while. It took me some little time to find out that the National Convention was postponed on account of these conferences and I am sure that most telephone men anticipate with keen interest the report Mr. Woods will have to offer very soon. This talk about a merger of all companies is sheer nonsense. A merged telephone system would not require physical connection. Physical connection does not mean a merger. I believe in physical connection, because it would make our own system a little private monopoly as long as we would treat with the public fairly. There would be no excuse for the Bell Telephone Company to parallel our lines and build a competing system. Nor would there be very much opportunity for another independent to do likewise. It would enable us to serve our public better by giving them long distance connection, and I know that before we enter into any such arrangement, we are smart enough to take care of our own interests. My knowledge of other independent telephone men prompts me to believe that they are equally competent to look after themselves.

* * *

According to recent dispatches, telephone stocks have been quite active with a tendency toward higher prices. For once, this report includes independent telephone securities, and it is all traceable to the story of merging telephone interests. Us little fellows may be pardoned for snickering in our sleeves. We knew that our telephone stocks were good, and we didn't have to go to the curb market to find it out. Wall Street was never asked for an opinion. There is quite some property scattered about the country, generally known as independent telephone system, that has not been recognized among the listed industrials, and it is comforting to know there is a hankering, now and then, to learn

more about us. The thing to do is to follow along the intelligent lines that have obtained for many years. It will all work out to our mutual satisfaction and profit just as sure as you are a foot high.

* * *

Ohio is always in the limelight. Right now every telephone man in that state seems to be interested in a proposed new law to regulate telephone companies. You may recall that there was considerable activity along similar lines a year ago. The legislature passed a law last year, but now it is found that another law should succeed the first one. The present law seems to have for its real purpose a foundation to permit the consolidation of competing exchanges, and to eliminate dual service entirely. A legislature that will enact a law that will meet all the requirements of the telephone companies in Ohio, deserves a vote of thanks. In addition to the many independent concerns, there is the Morgan interests, ostensibly independent; the Cleveland Telephone Company in Cleveland; the Cumberland Company in Cincinnati with Central Union owning practically all of the Bell exchanges. The American Telephone & Telegraph Company owns big blocks of stock in the Cumberland and the Cleveland concerns, but it does not control. The bill which is before the Ohio legislature is modeled along the lines of the New York public utilities law, but it goes further in granting regulation and supervision over the companies to the state. There seems to be no opposition among the various factions. The Bell and the independents are working for the measure, while Morgan and his crowd remain neutral. It would seem that the law is needed to confirm a great many of the transactions that have been underway in the Buckeye state for the past year.

* * *

I was shocked to learn that the old Pittsburg and Allegheney Telephone Company at Pittsburg had gone into the hands of a receiver. The petition alleges that false reports have been made as to the whereabouts of the company's funds. John A. Howard's name stands out conspicuously as being the seat of the trouble. The company has always been regarded as one of the strongest among independent operators, due in all likelihood to its bigness. Now that the affairs of the concern are in the hands of receivers, it is learned that the company has issued $2,000,000 of preferred and $2,000,000 of common stock, and bonds at the value of $1,400,000. Joshua G. Splane and William Flynn are the receivers. Mr. Splane has been identified with the company ever since it has had a history, and I am sure that he will do his level best to bring order out of the present distress.

It is a shame that this man Howard ever got into the telephone business. Everything he touched has gone to the bad in one form or another. He is so deeply involved that some of his suits are being carried in the name of his brother. I have never been able to read anything about Howard that did not tend to reflect against his integrity. To me, the wonder has always been that he could find enough big men to follow his lead. I fancy that eastern telephone operators will remember John W. Howard as the J. Rufus Wallingford of the business. He seems to have come into the work unheralded; he saw some easy money rusting, and he simply couldn't stand for it. With his known activity, he has caused more grief than any fifty other men who have ever put in an appearance.

* * *

I attribute my unusual interest in regulation of public utility corporations to my lack of knowledge of the subject. After all, it may be due to a woman's curiosity. As country operators we never have to cope with such problems. Our rates are purely arbitrary. They were intended to give us a profit and they are not wanting in that. State law gives us no concern beyond filing a report once a year with the state auditor. This performance brings us into contact with Jerry Meyers, our township accessor, but we would have to meet that minion of the law any way, whether we operate a telephone system or not.

So when I read the report of a committee that has been hired by a municipality, and who recommend rate reduction, I naturally think it over. An employee must be loyal to his employer. If a committee of experts are hired by a city council to find for the city, we expect this loyalty thing to permeate their report. In Chicago the newest committee found for the city, in absolute contradiction to the report of a previous body of experts. Loyalty gave way to ridiculousness. The case was simply heads, I win, and tails, you lose.

* * *

My sympathies go out to the big city operator, because there is a tendency to harass his work. It is a pity that franchises are not drawn more favorable to the big telephone companies. If the telephone companies of Chicago might have temporary rights to discontinue their service for a given period, not to exceed sixty days, I think that the citizens would demand larger accommodations at the penal institutes. The cutting off of telephone service in a big city has never been tried, but to do it would afford plenty of complications for a real telephone romance.

Then there is the labor problem. Workmen out here must stick to the coal burners in their homes. They do not enjoy all of the modern conveniences. Their hours are more nearly fashioned with those of the agriculturalist. A breakfast is common between 6:30 and 7:30 a. m. The city man is asleep. The item of overtime is purely a clock proposition with the employes of all big corporations. Gangs work in shifts. Out here, in cases of extraordinary trouble, the day shift works into the night, sticking it out to the end. Then it rests. Overtime is a gratuity instead of a necessity.

* * *

Nearly all franchise rights or privilege grants that have been given to public serving corporations, encourage a natural monopoly of the business and not infrequently offers protection against competition. To get such rights the seeker must deal with politicians. How remarkable it is that the citizen has any voice in the affair at all. This turning over to private use of public property is a great business. In the generations to come our children will take it back, but that isn't any concern of mine. The public is beginning to show an acute tendency to regulate the corporations enjoying special privileges. In Massachusetts the local authorities may arrange for a competing system with another company in any municipality. Under the arrangement the public utility corporation is obliged to tote fair. If, for any reason it is not behaving, the municipality invites competition. The local concern can appeal to the state commission with its complaint. If the state commission finds that the municipality is not clearly within its rights by ordering competition, it can block the action. On simiar propositions the laws in Massachusetts and in New York are much alike. If a municipality wants to go into the pub-

lic utility business in either state, it does not require a certificate of authority to do so, so long as the product is used strictly for municipal purposes, but if it intends to sell its product to the public, then it must have the permission of the state commission the same as any private company.

Wisconsin's laws regard the matter in a different way. Their law provides that no franchise shall be granted to any one who offers to compete where there is in operation a similar institution, without first securing from the state commission a declaration that public convenience is to be augmented. The public serving corporation in Wisconsin acts under what is known as an "undeterminate permit," which gives the corporation no protection except against competition. In the eyes of the state commission all public serving corporations look alike when it comes to regulation. It should be remembered, however, that while the indeterminate permit is absolute protection against competition, it does not permit a municipality from serving notice that it is ready to take over the job of running the plant. In such cases the commission is notified and the commission fixes the price that the municipality shall pay.

I would call the Wisconsin law a foxy measure, because it gives the municipality a strangle hold upon its public utility corporations, which have almost universally taken advantage of this indeterminate permit thing. The citizens in the Badger state do not have to stand for extortion. They have the law in their hands to take over any ugly institution that is not acting on the level, and in this respect the law is much better than that of Massachusetts or New York.

Telephone-Telegrams in Doubtful Status

Recent press dispatches have stated that so many embarrassing situations of a social nature have arisen over the practice of the Western Union and Postal Telegraph Companies of transmitting telegrams over the telephone that the method, begun last summer, may be discontinued, except for rural territory, or greatly modified.

The idea of telephoning the message instead of sending it by messenger arose not from a desire for economy but to serve the wishes and convenience of the public. The plan, it is claimed, has not proved a complete success. Besides the complaints and one lawsuit brought in Chicago, over the telephone feature of the service, it is said a large pile of letters condemning the practice have been received.

One of the complaints had to do with an interesting message about a family affair which was received by a maid. She told her best friend and this one told another, and so it went until every maid, butler, footman, and chauffeur who knew the family most concerned knew the nature of the message.

An editorial in the New York *American* of January 23 said in part:

It is possible now to send a telegram anywhere in the United States or in the world by calling telephone headquarters and dictating the telegram over the telephone. This means time saving, labor saving, which is to say, that it means higher efficiency, higher civilization.

Because there has been some difficulty with the sending of such telegrams; because some servant girl is alleged to have received and read a telegram not intended for her unholy eyes, and because the telephone and the telegraph company might be sued by dissatisfied senders of telegrams, it is proposed to abolish the combination of the telephone and the telegraph wires.

This proposal is foolish, reactionary and unworthy of a sensible man. If a telegraph message can be sent over the telephone wire, making needless the sending of a little boy late at night through the cold and the wet, why, in the name of goodness, not use the telephone, and save the time and the needless effort?

Let it be understood that those who thus send telegrams over the telephone wire do so at their own risk, and are willing to abide by that risk. The combination of telegraph and telephone is a great public service.

The telephone company which use the system declare that they have no knowledge of any contemplated changes in the telegraph arrangements.

A Year's Growth of the Telephone

Since the article by W. H. Gunston, published last month, later statistics with regard to Australia are now obtainable, which show that the Commonwealth now possesses 75,870 telephone stations, says the *National Telephone Journal*, London. They are distributed in the principal states as follows:

New South Wales	31,888
Victoria	21,112
Queensland	7,256
South Australia	6,606
Western Australia	6,514
Tasmania	2,494
	75,870

These, added to the 29,681 stations in New Zealand, make the total number of telephones in Australasia 105,551 instead of over 80,000 as estimated, and increase the total for the world to some 10,341,000.

The development of the principal cities in Australia is shown in the following table:

	—Beginning of—	
Sydney area	16,392	18,239
Melbourne area	.....	16,778
Adelaide	.....	4,816
Brisbane	.....	2,698
Perth	2,554	2,752
Newcastle area	828	897
Ballarat	.....	794

Melbourne is therefore a naddition to the list of towns with over 10,000 telephones.

Big Independent-Bell Merger Rumored

Officers of the Kinloch Telephone Company at St. Louis are responsible for published statements to the effect that preliminary steps for a merger of the principal independent telephone systems with the American Telephone and Telegraph Company have been taken by banking interests allied with the Bell system. The announcement told of proposals to the Kinloch and other independent systems in the Middle West.

The plan does not involve the immediate purchase of the independents, but it was explained, is an arrangement by which the various "outside" systems may be got into shape for a combination with the Bell companies should a consolidation be found possible under the Sherman law.

Within the last several years the independent telephone companies have developed widely, particularly in the farming communities, and the aggregate of mileage outside of the Bell system is large. Various attempts at consolidation have been made. Within the past two years several of the companies in the lake states passed into the hands of J. P. Morgan & Company.

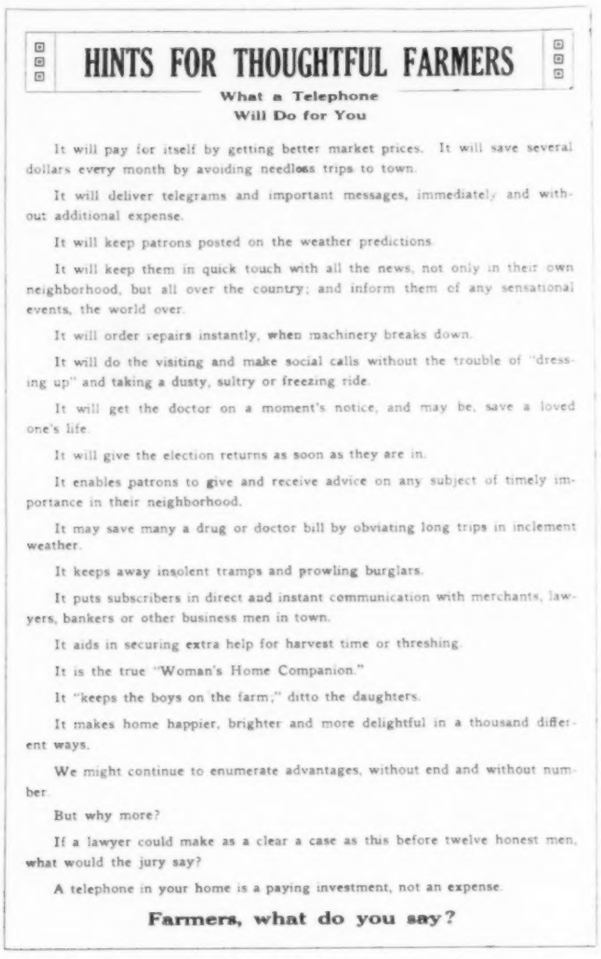
The negotiations now under way, it was explained, are entirely of a tentative character and are dependent on the clearing of legal difficulties, as well as an agreement upon valuations.

Telephone Exchange Directories

By Will M. Traer and J. E. Magly

WE are in receipt of a copy of the directory of the Fulda Telephone Company, Fulda, Minnesota, that was issued some time ago, and we are glad to be able to say that it is a mighty good looking directory in every respect. It is as neat as it can be from cover to cover. It contains a lot of local advertising, its pages are numbered, and there is an index to the advertisements.

One thing it contains that we cannot remember having noticed in any other directory, and that is a



HINTS FOR THOUGHTFUL FARMERS

What a Telephone Will Do for You

It will pay for itself by getting better market prices. It will save several dollars every month by avoiding needless trips to town.

It will deliver telegrams and important messages, immediately and without additional expense.

It will keep patrons posted on the weather predictions.

It will keep them in quick touch with all the news, not only in their own neighborhood, but all over the country; and inform them of any sensational events, the world over.

It will order repairs instantly, when machinery breaks down.

It will do the visiting and make social calls without the trouble of "dressing up" and taking a dusty, sultry or freezing ride.

It will get the doctor on a moment's notice, and may be, save a loved one's life.

It will give the election returns as soon as they are in.

It enables patrons to give and receive advice on any subject of timely importance in their neighborhood.

It may save many a drug or doctor bill by obviating long trips in inclement weather.

It keeps away insolent tramps and prowling burglars.

It puts subscribers in direct and instant communication with merchants, lawyers, bankers or other business men in town.

It aids in securing extra help for harvest time or threshing.

It is the true "Woman's Home Companion."

It "keeps the boys on the farm," ditto the daughters.

It makes home happier, brighter and more delightful in a thousand different ways.

We might continue to enumerate advantages, without end and without number.

But why more?

If a lawyer could make as a clear a case as this before twelve honest men, what would the jury say?

A telephone in your home is a paying investment, not an expense.

Farmers, what do you say?

A Page from the Fulda Telephone Company's Directory.

calendar for the current year. This is an idea worthy of imitation.

Another feature about the directory that strikes us as a good thing and which occupies a full page opposite the first page of the alphabetical subscribers' list is a number of hints for telephone users. It is reproduced here.

Last, but not least in consideration, is the outside front cover, which shows a tasty arrangement and a pleasing effect. The cover contains a good deal of reading matter, but it does not appear a bit crowded because care has been given to its make-up.

* * *

We have a copy of the last directory of the Fort Dodge Telephone Company, Fort Dodge, Iowa. Heretofore exchange directories from this company have been practically free from fault and we are sorry we cannot say the same regarding this copy.

The general make-up of the directory is first-class, but the presswork and composition of the subscribers' list are bad. The ink is run so light on some of the pages that it is hard to read the listings, and the subscribers' names do not line up nicely at the beginning of the line as they should—in fact, the line up is very poor.

Perhaps we would not be quite so strong with our criticism of this number if we did not know that it is easily possible to turn out a better job in Fort Dodge.

One more fault we want to find is with the colors on the cover. The blue is all right but the red is a dead brick color, not in the least striking or attractive.

* * *

Another first-class directory that we have recently received is that of the Franklin Telephone Company, Franklin, Indiana. It is well arranged. The composition is first class and a very good new feature appears: The display advertising is all on colored inserts. Of course, this idea is expensive, but we believe it adds value to the advertising, which makes a good talk for the solicitor. We are pleased to note also in the back section a number of pages of foreign advertising printed in two colors of ink—red and black. Some of this advertising is from Chicago, Fort Wayne, Indianapolis, Cleveland and a number of Indiana cities. This is an entirely new thing and we do not see why telephone companies in all parts of the country can not do the same thing with profit to themselves. We have long insisted that the advertising pages of the telephone directory may be made a source of considerable revenue if a little effort is put forth in the solicitation of advertising matter, both local and foreign. In doing this it is not necessary to carry mail order advertising and thereby incur the displeasure of your home merchants.

William Flynn and Joshua G. Splane of Pittsburg, Pa., have been appointed receivers for the Pittsburg and Allegheny Telephone Company, one of the largest independent companies in the country. Their bond was placed at $125,000. The petition was filed by H. V. McCollough, a stockholder, who alleged that false reports as to where funds of the company were deposited had been made by Treasurer S. W. Harper, with the knowledge of the president, John A. Howard.

The company has issued and outstanding $2,000,000 of preferred and a like amount of common capital stock, with bonds at a value of $1,400,000. The petitioner claims that none of the directors is a stockholder except Splane, former Senator Weller and Robert C. Hall, of Pittsburg, the five shares credited to each of the others being owned by the National Telephone Company of West Virginia.

Damage to Chestnut Poles by Insects

By Thomas E. Snyder*

IT has recently been determined through special investigations conducted principally by the writer that serious damage is being done to bases of standing chestnut telephone and telegraph poles in certain localities by the grub or larva of a wood-boring beetle, here called the chestnut telephone-pole borer.*a* The character and extent of the damage under different conditions of site in several localities have been determined, and poles treated with various preservative substances have been inspected to compare the efficiency of both chemicals and methods of treatment. These investigations have resulted in the determination of practical methods of preventing injury to poles by wood-boring insects.

HISTORICAL DATA.

The first information of serious damage to standing chestnut poles by wood-boring insects was conveyed in a letter, dated December 15, 1906, from E. O. Leighley, a correspondent of this bureau, reporting damage to telephone poles in Baltimore, Md., by borers. A. B. Gahan, assistant entomologist of the Maryland Agricultural Experiment Station, College Park, Md., who investigated the injury to the poles, stated that it was the work of a borer and was located just beneath the surface of the ground. Mr. Gahan brought specimens of the work and the insect to this office. The borers were identified as cerambycid larvæ, and later were determined to be the chestnut telephone-pole borer (*Parandra brunnea* Fab.).

On December 16, 1906, H. E. Hopkins, division superintendent of a telephone company, stated that the poles in West Virginia were badly injured by borers and that these borers were abundant. On March 8, 1907, he collected larvæ from chestnut telephone poles at Pennsboro, W. Va. These were determined to be the larvæ of the chestnut telephone-pole borer.

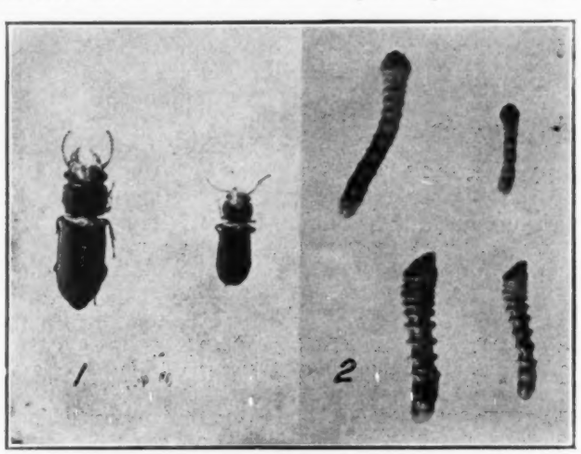


Fig. 1.—The Chestnut Telephone-pole Borer (*Parandra brunnea*): Male and Female Beetles. Fig. 2.—The Chestnut Telephone-pole Borer: Young Larvæ, Dorsal and Lateral Views. Fig. 1, Slightly Enlarged; Fig. 2, Twice Natural Size. (Original.) T. E. Snyder, Bulletin No. 94, Part 1, Division of Entomology, U. S. Dept. of Agriculture.

The writer on October 3, 1909, inspected some chestnut telegraph poles which had been standing for about twelve years on New York avenue, in Washington, D. C. The poles had been taken down under orders from the city authorities, which necessitated the placing of wires in conduits under ground, and they had been lying in piles for about a month before they were inspected. The chestnut telephone-borer had been working in the base of the poles, and white ants, or termites, were associated with them. Twelve out of the 103 poles examined had been damaged, some more seriously than others.

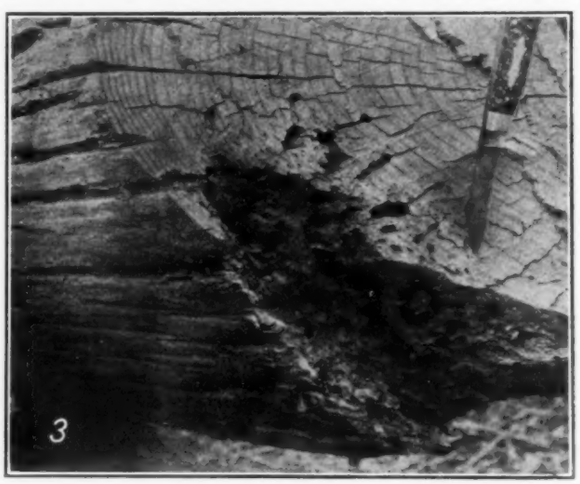


Fig. 3.—Damage to an Untreated Chestnut Telegraph Pole Near Surface of Ground by the Chestnut Telephone-pole Borer. (Original.) T. E. Snyder, Bulletin No. 94, Part 1, Division of Entomology, U. S. Dept. of Agriculture.

On October 15, 1909, H. E. Hopkins sent a reply to a request by Dr. A. D. Hopkins for further information regarding insect damage to poles in West Virginia. He stated that in one line built twelve years ago (40 miles long, 36 chestnut poles to the mile, poles 20 to 40 feet long and 5 to 12 inches in diameter at the top) approximately 600 poles had been rotted off at the top of the ground, and inspection showed that 95 per cent of the damage was directly or indirectly due to insects. Other lines in this division were reported to be in about the same condition. It was later determined that most of the insect damage was the work of the chestnut telephone-pole borer.

Dr. A. D. Hopkins states in a recent comprehensive bulletin that "construction timbers in bridges and like structures, railroad ties, telephone and telegraph poles, mine props, fence posts, etc., are sometimes seriously injured by wood-boring larvæ, termites, black ants, carpenter bees, and powder-post beetles, and sometimes reduced in efficiency from 10 to 100 per cent." Thus, while it has been known that almost all classes of forest products that are set in the ground are seriously injured by wood-boring insects, the problem of insect damage to standing poles, posts, and other timbers has never been made the subject of a special investigation.

In May, 1910, this study was assigned to the writer, and, in addition to a study of the insects involved, investigations in coöperation with telephone and telegraph companies have been conducted in the District of Colum-

*Bulletin No. 94, Part I, Bureau of Entomology, U. S. Department of Agriculture.

a *Parandra brunnea* Fab.; Order Coleoptera, Family Spondylidæ.

bia, Maryland, Virginia, Pennsylvania, New Jersey, and New York. Through the courtesy of the Western Union Telegraph Company several telegraph lines were inspected in July and August, 1910, in Virginia, where the poles were being reset or replaced. Here the butts of over 200 poles set under different conditions of site were thoroughly examined for insect damage, and sometimes the entire pole was split open. In one line 10 to 12 years old (approximately 30 chestnut poles per mile, 25 feet long, about 6 inches diameter at the top, 10 inches at the base, and apparently of second quality), between Petersburg and Crewe, Va.—the poles had already been reset once, east of Wilson, Va.—serious damage by the chestnut telephone-pole borer rendered from 15 to 20 per cent of the poles unserviceable. After the present second resetting it was estimated that the poles can not last more than four or five years longer. West of Wilson the poles were naturally in much worse condition, and many were broken off and only held up by the wires on the sounder poles. In another line examined, between Portsmouth and Boykins, Va. (poles 30 feet long and apparently of second quality), serious damage by this borer averaged about 10 or 15 per cent, and between Boykins, Va., and Weldon, N. C., according to a linesman, 50 per cent of the poles are badly decayed near the surface of the ground. Much of this damage, however, is due to fungous heart rot. According to a statement by the foreman of a resetting crew, between Asheville, N. C., and Spartanburg, S. C., hundreds of chestnut poles were badly decayed in the 67 miles of line reset, and were only held up by the wires. The line was 15 years old. There was serious damage by "wood lice" (termites) and also by "white wood worms."

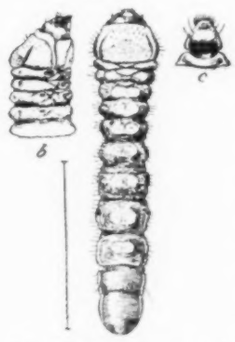


Fig. 4.—The chestnut telephone-pole borer (*Paranadra brunnea*): Full-grown larva. (About twice natural size. (Original.)

THE CHESTNUT TELEPHONE-POLE BORER—CHARACTER OF THE INSECT.

The chestnut telephone-pole borer is a creamy white, elongate, stout, cylindrical, so-called "round-headed" grub

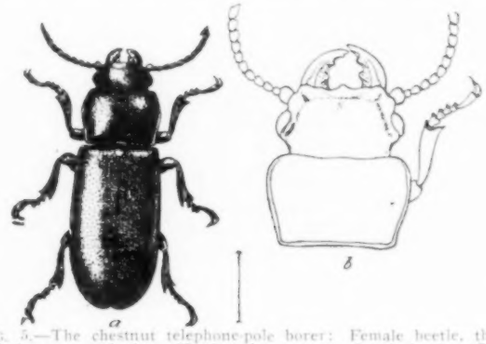


Fig. 5.—The chestnut telephone-pole borer: Female beetle, three and one-half times natural size. Head and pronotum of male beetle. (Original.)

or "wood worm" (Fig. 4), which hatches from an egg deposited by an elongate, flattened, shiny, mahogany brown, winged beetle from two-fifths to four-fifths of an inch in length. (Fig. 1 and Fig. 5.) The eggs are probably deposited from August to October in shallow natural depressions or services on the exterior of the pole near the surface of the ground; often the young larvæ enter the heartwood through knots. The young borers (Fig. 2) hatching therefrom eat out broad shallow galleries running longitudinally in the sapwood, then enter the heartwood, the mines being gradually enlarged as the larvæ develop. As they proceed, the larvæ closely pack the fine excreted boring dust behind them. This débris, which is characteristic of their work, is reddish to dunnish yellow in color and has a claylike consistency. The mines eventually end in a broad chamber, the entrance to which is plugged up by the excelsior-like fibers of wood chiseled out by the strong mandibles of the larvæ. Here the resting stage (Fig. 6), or pupa, is formed, and in this chamber the perfect adult spends considerable time before emerging. Often all stages from very young larvæ only about one-fourth inch long to full-grown larvæ over one inch long, pupæ, and adults in all stages to maturity are present in the same pole. Adults have been found flying from July to September. As yet the seasonal history of this borer has not been completely worked out.

DISTRIBUTION.

This insect is very widely distributed, ranging from Ontario, Canada, to Texas, eastward to the Atlantic coast, and westward to Arizona and southern California. It is common throughout the natural range of the chestnut—and in this connection it should be observed that most of the chestnut poles are purchased from local timberland owners.

Fig. 6.—The chestnut telephone-pole borer: Pupa, slightly more than twice natural size. (origonal.)

CHARACTER OF THE INJURY.

The injury to the poles consists in large mines in the wood near the line of contact of the pole with the ground, necessitating the frequent resetting or even the replacement of the damaged poles. These irregular galleries of the grub (Fig. 7) run both horizontally and longitudinally throughout the heartwood, and are sometimes seven inches long, but vary with the individuals, which show great differences in size. The borers usually work in the outer layers of the wood at the base of the pole for a distance of from two to three feet below, and sometimes from one to two feet above the line of contact of the pole with the surface of the ground. The greatest damage is to that area just below the surface of the ground (Fig. 3); here the conditions of air and moisture are most favorable. Often the entire butt up to a distance of from four to six feet and higher, according to the depth of setting, is mined. The numerous galleries, often very close together, completely honeycomb the wood in a zone three to four inches in from the exterior of the poles; this so weakens the poles that they break off close to the surface of the ground. The basal two feet is usually sound. Even if the damage is not serious enough to cause the poles to break off under strain, they are likely to go down during any storm, and thus put the wire service out of commission; such damaged poles are a serious menace along the right of way of railroads. The beetle will attack poles that are perfectly sound, but evidently prefers to work where the wood shows signs of incipient decay; it will not work in wood that is "sobby" (wet rot), or in very "doty" (punky) wood. It has not yet been determined just how soon the borers usually enter the poles after they have been set in the ground. However, poles that had been standing only four or five years contained larvæ and

adults of this borer in the heartwood, and poles that had been set in the ground for only two years contained young larvæ in the outer layers of the wood.

Poles that appear sound on the exterior may have the entire basal interior riddled, and the work of the borers is not noticed until the poles break off. If merely isolated poles are injured, the poles that are broken off are held up by the wires and can be detected by the fact that they lean over, but if several adjacent poles are affected, especially where there is any unusual strain, that portion of the line is very likely to go down. The presence of the borers in injurious numbers can be determined only by removing the earth from about the base of the pole; the exit holes of the borer are found near the line of contact with the soil. Often large, coarse borings of wood fiber project from the exit holes. Sometimes old dead parent adults are found on the exterior of the poles underground. During August the young adults may be found in shallow depressions on the exterior of poles below the ground surface.

Fig. 7.—Gallery of the Chestnut Telephone-pole Borer. Showing Pupal Chamber with the Entrance Plugged with Excelsior-like Wood Fibers; Work Near Base of Pole, Below Ground. Fig. 8.—Mines of the Chestnut Telephone-pole Borer Near Surface of Ground. Natural Size. (Original.) T. E. Snyder, Bulletin No. 94, Part 1, Division of Entomology, U. S. Dept. of Agriculture.

IMPORTANCE OF THE PROBLEM.

The subject of the relation of insects to the rapid decay of chestnut poles has not been thoroughly investigated in the past, but now that the supply is becoming scarcer it is especially important to know what are the various primary causes of the deterioration of these poles, hitherto described under the vague term "decay." Although the chestnut telephone-pole borer has not hitherto been considered an insect of any economic importance, and has been described in entomological literature as only living under bark, principally of pine, or in the decomposing wood of various species of deciduous and coniferous trees, the evidence is abundant that breeding in the bases of chestnut poles is not a newly acquired habit. It has also been determined that this beetle damages many species of living forest, fruit, and shade trees that have been previously injured by fire or other causes, and often leads to the destruction of trees that would otherwise recover from such wounds, and while not normally a primary enemy to trees, may thus become of more than secondary importance.

The damage by the chestnut telephone-pole borer is especially serious in consideration of the fact that in many parts of its range the chestnut is threatened with extinction as a tree species on account of the very severe ravages of the combined attack of an insect *a* and a fungous disease. Further unnecessary drain upon the supply of chestnut timber should be avoided by protecting that already in use and thus prolonging its length of service.

EXTENT OF DAMAGE AND LOSS.

As more than one-fourth of the 3,500,000 round poles exceeding twenty feet in length used annually by telephone, telegraph, and other electric companies are chestnut (Kellogg, 1909), and as this borer has seriously damaged as high as 10 to 40 per cent, varying with conditions of site, of the chestnut poles which have been set in the ground for from ten to twelve years in lines in North Carolina, Virginia, West Virginia, Maryland, and the District of Columbia, it is evident that this insect is an important factor in decreasing the normal length of service of the poles.*c* In lines from twelve to fifteen years old the damage is much greater, and at the end of this number of years of service any line in which poles of this species are set has to be practically renewed. According to a statement in Forest Service Bulletin 78 (Sherfesse, 1909), "approximately four per cent, or 5,-

a Agrilus bilineatus Web.

c The average life of a chestnut pole is eight to ten years (Sherfesee and Weiss, 1909).

908,000 feet board measure of the 147,720,000,* feet board measure of standing poles annually requiring replacement in the United States, is destroyed by insects." If only chestnut poles be considered, at least ten per cent of the poles reset or replaced are injured by insects.

FAVORABLE AND UNFAVORABLE CONDITIONS FOR DESTRUCTIVE WORK.

The damage is apparently greatest and the borers are most abundant where the poles are set in high or level dry ground under good conditions of drainage. Such sites are the crests of railroad cuts through low hills, slopes of "fills," and in cultivated or other fields. Where the poles are in wet sites there is usually but little injury by wood-boring insects except to that portion near the surface of the ground. Conditions of drainage are more important than different soil combinations, and the condition of the soil is more important than its composition; *i. e.*, where the soil is hard packed there is apparently less damage than where it is loose. The quality and condition of the poles before setting is a very important factor to consider before arriving at any conclusions as to the relative longevity of poles under various conditions of site. Green (unseasoned) or imperfectly seasoned poles are less durable than those thoroughly seasoned. Poles that are defective *a* before setting, as they very often are (*i. e.*, showing evidence of incipient decay), and poles that have the heartwood mined by the chestnut timber worm, *b* the work of which is very abundant, will, of course, decay much more rapidly than poles that are in an absolutely sound condition. The galleries of the chestnut timber worm afford an entrance to the spores of wood-destroying fungi, and thus greatly accelerate decay. White mycelium compactly filled these galleries throughout many standing poles, thus clearly proving that these mines aid greatly in enabling the fungus heart rot more rapidly and completely to penetrate the entire heartwood of the poles. If the injury by both wood-boring beetles and wood-destroying fungi (between which there is a varying interrelation) be considered, then in several lines from ten to twelve years old in North Carolina, Virginia, and West Virginia at least fifty per cent of the poles are either rendered unserviceable or their length of service is much shortened.

ASSOCIATED WOOD-BORING INSECTS.

It is not to be concluded that this wood-boring beetle is the only insect that injures standing chestnut poles. Indeed, the most common injury is by the "wood lice" or white ants. *c* In lines from ten to twelve years old these insects have seriously damaged as high as fifteen per cent of the poles, and their work is often present, at least superficially, in as high as seventy-five per cent of the poles under all conditions of site. However, the damage is usually to the outer layers of the wood, where it is moist or there is incipient decay, and is more superficial and localized than that of the chestnut telephone-pole borer. Nevertheless, white ants often completely honeycomb the sound heartwood of poles, especially at the base. They work both in sound wood, "doty" (dry rot) wood, and "sobby" (wet rot) wood. Sometimes a large channel runs up through the core of the heart and the sides are plastered with clay, forming a hollow tube with several longitudinal galleries. Their work often extends from two to four feet above the surface of the ground. They leave the outer shell of the wood intact and work up through the longitudinal weathering checks, covering the exterior of the pole with earth to exclude the light. White ants will damage poles that have been set in the ground only two years. Evidently they enter the pole from below the surface of the ground. The habits and characteristics of these peculiar and interesting insects have been thoroughly discussed in Circular No. 50 of this bureau by C. L. Marlatt.

A giant round-headed borer *a* is sometimes found in the poles, usually in association with the chestnut telephone-pole borer. In poles where the wood is sound this borer apparently works as a rule only in the outer layers of the wood, the galleries running longitudinally through the heart below the surface of the ground. In poles where there is decay it will completely honeycomb the heartwood near the surface of the ground.

In several poles where the wood was "doty" a large Scarabæid *b* which has before been found in decayed oak railroad ties was present and caused the poles to break off sooner than they otherwise would. The irregular galleries of the grub completely honeycomb the decayed heartwood near or just below the surface.

A flat-headed borer *c* and wireworms *d* were found in galleries locally in the more or less decayed heartwood of several poles. A large black carpenter ant *e* does some damage to sound poles set in dry ground through woodland. This ant often widens the lingitudinal weathering checks and thus accelerates decay. A small black ant *f* was very numerous in many poles, but its work is usually confined to the outer layers of the wood. The work is often throughout "doty" poles. Injury by this ant is not primary, but it also widens weathering checks, enlarges other defects, and induces more rapid decay.

PREVENTION OF INJURY.

Doctor Hopkins makes the following statement in a recent bulletin *g*:

> Insect damage to poles, posts, and similar products can be prevented to a greater or less extent by the preservative treatments which have been tested and recommended by the Forest Service for the prevention of decay. These should be applied before the material is utilized for the purpose intended, or, if it be attacked after it has been utilized, further damage can be checked to a certain extent by the use of the same substances.
>
> It is often of prime importance to prevent injury from wood-boring insects, for the reason that such injuries contribute to more rapid decay. Therefore anything that will prevent insect injury, either before or after the utilization of such products, will contribute to the prevention of premature deterioration and decay.

Through the courtesy of the American Telephone and Telegraph Company and the Forest Service, about forty chestnut poles set in a test line near Dover, N. J., were inspected by the writer on July 15, 1910, in company with engineers of the telephone company and H. F. Weiss, assistant director, Forest Products Laboratory, Forest Service, to determine the relative merits of various

*In the Bulletin the figures are given as 5,908 and 147,720. Correction made by author.

a Often this evidence is the old galleries of the destructive two-lined chestnut borer (*Agrilus bilineatus* Web.), showing that the tree must have been dead before it was cut for a pole, and hence is more likely to be defective throughout the interior; in other instances heart rot is clearly present.

b *Lymexylon sericeum* Harr.

c Identified by Mr. Theodore Pergande of this Bureau as *Termes flavipes* Kollar.

a *Prionus* sp.

c Identified by Mr. H. E. Burke, of this Bureau, as *Buprestis rufipes* Oliv.

d Species of the family Elateridæ. The large larvæ of *Alaus* sp. were especially injurious.

e Identified by Mr. Theodore Pergande as *Camponotus pennsylvanicus* Mayr.

f Identified by Mr. Theodore Pergande as *Cremastogaster lineolata* Say.

g Insect Depredations in North American Forests. Bul. 58, Part V, Bur. Ent., U. S. Dept. Agr., p. 84, 1909.

methods of preventing damage by wood-boring insects to the bases of poles. In this line, which is eight years old, variously treated poles alternated with untreated poles in order that each chemical preservative and method of treatment might be given an absolutely fair test under the same conditions of site. The poles were 30 feet long, 7 inches in diameter at the top, and 33 inches in circumference 6 feet from the base. In this inspection the earth was removed (to a depth of about one foot) from the base of the pole, and then the pole was chopped into to determine the rate of decay. This method of inspection for insect damage is not very satisfactory. The various methods experimented with in this test line were brush treatments with a patented carbolineum preservative and spirittine, charring the butt, setting the pole in sand, and setting it in small broken stone. It was found that, although these methods may temporarily check the inroads of wood-boring insects, they will not keep the insects out of the poles. The most serious damage to the poles in this line was by white ants. Other insect damage was by a large black carpenter ant *a* and the larvæ of a round-headed borer.*b*

An inspection was made, between September 6 and 14, 1910, of the bases of over 400 chestnut poles set in a similar test line near Warren, Pa., and Falconer, N. Y. These poles were treated by the creosote "open-tank" method of impregnation, and the brush treatments of creosote, wood creosote, creolin, two different carbolineum preservatives, and tar; they had been set in the ground for a period of five years. All these treatments, except the brush treatments with creolin and tar, were efficient in preventing the attacks of wood-boring insects, at least for a five-year period, in this northern climate. There was but little damage by insects to the poles in this test line. The most common injury to the untreated poles was by the large black carpenter ants which widen the longitudinal weathering checks, and hence induce more rapid decay. The work of the chestnut telephone-pole borer was found in several poles, and this beetle was evidently just beginning to attack these poles. There was some damage by a round-headed borer.*a* No white ants or termites were present, and this is evidently too far north for these destructive borers. A report by inspectors of the American Telephone and Telegraph Cimpany and the Forest Service on the remainder of the poles in this test line (between Jamestown and Buffalo, N. Y.) not personally inspected by the writer, showed that these conclusions can be applied to all the poles in the line with the exception that there was superficial injury by small black ants to two poles treated by brush treatment of carbolineum avenarius and to two treated with wood creosote; also, as the inspection progressed, injury by the chestnut telephone-pole borer became more abundant and serious, and the borers seemed to be established in the poles. The poles treated by the creosote "open-tank" method of impregnation and by brush treatments with creosote and with "S. P. F." carbolineum remained uninjured.

Methods of treating poles superficially by brushing with various preservatives have proved to be temporarily efficient in keeping wood-boring insects out, if the work is thoroughly done and not only the butt, but also the base, is treated. If the pole is not thoroughly brushed, insects enter through the untreated or imperfectly treated portions, especially through weathering checks and knots. Where the base is left untreated, insects, especially white ants or termites enter the pole from below ground and, avoiding the treated portions, come right up through the pole.

The few poles of southern yellow pine in a line near Bartley, N. J., inspected on July 15, 1910, which had been impregnated with creosote by the Bethell cylinder-pressure process, 12 pounds of oil to the cubic foot, and had been set in the ground since February, 1903, were apparently absolutely free from signs of decay or damage by wood-boring insects. In another line, running between Norfolk, Va., and Washington, D. C., the few poles (12 years old, of squared—with the sapwood cut away—southern yellow pine) inspected on August 10, 1910, near Portsmouth, Va., which had been impregnated with creosote by the Bethwell cylinder-pressure process, were also apparently absolutely sound.

Thus, it is evident that impregnating the poles with creosote by some standard process (either the open-tank or the cylinder-pressure process) will keep wood-boring insects out and preserve the poles for a much longer period than they would last untreated. In the open-tank method only the area most subject to the attack of wood-boring insects and deterioration in general (*i. e.*, the basal 8 feet) is treated, while by the cylinder-pressure process the entire pole is impregnated. Alternating less susceptible juniper (red cedar) *b* poles or pine poles thoroughly impregnated by some standard process in the line with the chestnut poles would be a safeguard in holding up an old line where the damage is found to be serious on resetting.

a Camponotus pennylvanicus Mayr.
b Prionus sp.
a Prionus sp.
b Juniperus virginiana.

Telephones in Nova Scotia.

Consul Alfred J. Fleming, Yarmouth, says the Yarmouth telephone system, which up to two years ago gave an inadequate service, is now a part of the Nova Scotia company, with headquarters at Halifax, and operates more than 400 telephones in Yarmouth. About fifty farmers living within ten miles of the city have also installed telephones, and exchange stations have been established at seven towns in the district, covering 100 miles of wire and having in each place 6 to 52 telephones, making a grand total of 620 telephones in Yarmouth system.

In the local system there are now 1,070 miles of wire, of which 327 miles are inner cable, 192 miles underground cable, 105 miles aerial wire, and a large quantity duct underground wire. There is considerable ordinary pole wiring, most of which is on the farmers' lines and in the outskirts of the city, but which is gradually giving way to cables.

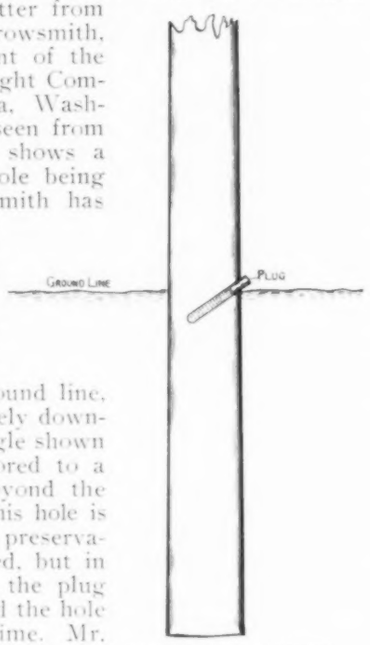
The local manager states that the cost of the system averages from $150 to $175 per mile, completed and ready for operation. There are altogether 50 employees of the system, including operators, linemen, superintendents, and electricians. Operators (girls) are paid $15 to $25 per month; linemen, $30 to $40; and extra men, $60 to $75.

Nearly all the wire used comes from England; some from the United States. A considerable number of the appliances come from the United States. Few institutions in this part of the province have increased as has the telephone service, and the company is extending, enlarging, and improving its system, making every endeavor to keep abreast of the times in improvements and modern appliances.

The Telephone Scrap Book

Another Way of Treating Standing Poles

AN article describing a system of impregnation of standing poles, by H. H. Bement in TELEPHONE ENGINEER for November, 1910, told of a method of attaching a reservoir to a standing pole and allowing the preservative oil to pass gradually by capillary action from the reservoir into the pole. The article brought a very interesting letter from Mr. George C. Arrowsmith, general superintendent of the Pacific Power and Light Company, North Yakima, Washington. As will be seen from the diagram, which shows a cross section of a pole being treated, Mr. Arrowsmith has an extremely simple method of impregnating the standing pole. The system consists in boring a two-inch hole at the base of the pole, that is just above the ground line, which extends obliquely downward at about the angle shown in the cut and is bored to a point four inches beyond the heart of the pole. This hole is simply filled with the preservative and then plugged, but in such a manner that the plug can be withdrawn and the hole refilled from time to time. Mr. Arrowsmith reports that the company has one line of 60-foot poles a hundred miles in length. Each pole is bored and treated as described. The line has been in operation two years or so, and in that time the holes have been filled with preservative three times. The company expects to fill them two or three times more before the pores of the wood are so filled with the preservative that they will not take up any more of it. Two years is hardly time enough to judge of results as yet, but it seems hard to find any flaw in the system. Of course a sixty-foot pole would be heavy enough to stand a two-inch hole at its base, while a smaller pole, such as ordinarily used by telephone companies, might not. No doubt a one-inch hole, however, would do as well for a smaller pole as the two-inch hole does for the larger. As a matter of fact the hole bored into the base of the pole does not weaken it nearly so much as might be supposed at first thought.



Standing Pole Treatment.

A Composite Artillery Type Telephone

A COMPOSITE artillery type telephone, as described by a writer in the *Journal of United States Artillery*, derives its name from the fact that it was designed to operate either from a 30-volt central storage battery in common with all the other telephones belonging to the same fire command, or from two dry cells in each telephone. Owing to the heavy cost of renewals primary batteries are supplied only during time of war.

A typical diagram of two instruments connected to the same line is shown in the figure. For common battery operation a battery switch on the left of the telephone case is closed on a dummy post marked "Common Battery," in which position the local primary circuit is broken. Slipping the switch to the "Common" post does not make a circuit. The operation of these telephones requires three circuits, the primary or talking, secondary or hearing, and ringing circuits.

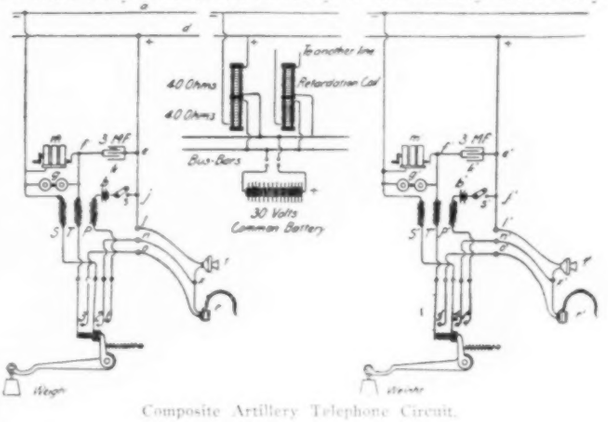
The primary current in each telephone passes through the secondary of an induction coil, so that any fluctuation in its strength will produce a current in the tertiary winding. This current, after leaving the coil, will divide into three branches, two entirely local through the receiver of the home instrument, and the other external through the receivers of the distant instruments.

As the condenser k is placed across the line through c on one side and through the secondary S, receiver r and the tertiary T on the other, the potential across the terminals of the condenser will vary with every fluctuation in the line potential. The condenser will, therefore, charge and discharge, producing an alternating current effect which follows the same circuit as, and tends to amplify, the current induced in the tertiary T by variations of current strength in the primary circuit.

Hearing, therefore, results from the combined action of the three currents flowing through the receiver, viz.: the local branch of the current induced in the home instrument, the line branches of the currents induced in the distant instruments and the charge and discharge currents from the condensers of all instruments.

In local battery operation the storage battery switch is open at the storage battery room or terminal cabinet and the battery switch S, at each instrument, is moved onto a contact marked "Local Battery."

Each local battery energizes all primary circuits so that only one local battery is absolutely necessary



Composite Artillery Telephone Circuit.

on one line, but, owing to the difference in the resistances of the local and the line branch of the primary circuit, comparatively poor transmission will be secured from the instruments which have no local battery.

The relatively high internal resistance of the cells,

in conjunction with the resistance of the primary winding of the induction coil, replaces the common battery retardation coil in producing variations in the line voltage necessary for the operation of the distant instruments.

Talking into any transmitter changes the external resistance of the battery circuit and consequently varies the line potential and the primary circuit of every telephone on the line. These currents all pass through the primary of the induction coil, consequently their fluctuations induce secondary currents in both the secondary and tertiary windings.

These secondary currents are superimposed in each receiver.

Experimental Wireless Telephone

ACCORDING to John L. Hogan, Jr., in the *Electrical World*, wireless telephony by true electromagnetic radiation may be accomplished with the aid of very simple apparatus. Speech was transmitted two and one-quarter miles with a power expenditure of less than 100 watts. The arrangement of the transmitting apparatus is shown in Fig. 1. In this sketch *A* represents the antenna; *B* is a low-resistance coil of wire so designed that the whole or any part of it may be put into circuit to balance the wave-length that which is to be transmitted. *C* represents a carbon microphone transmitter which carries a current of four or five ampere without undue heating. *D* is a high-frequency alternator driven at 28,200 revolutions per minute by a steam turbine. At this speed the alternator produces current at 70,600 cycles, corresponding to a wave-length of 4,250 m. *E* is an earth connection.

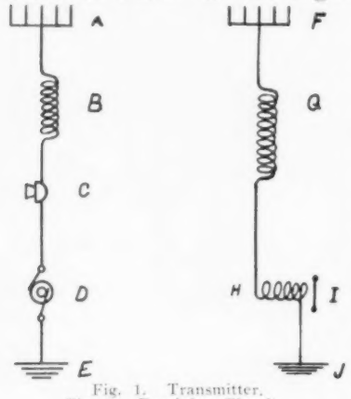


Fig. 1. Transmitter.
Fig. 2. Receiving Circuit.

Any continuously acting receiving apparatus which is capable of giving responses proportional to the amplitudes of the received waves will reproduce the speech which operates the transmitter, provided, of course, that the receiver is within effective range of the sender.

Figure 2 is a diagram of the receiving system used. Here the antenna wires are represented by *F* and the variable tuning inductance by *G*. *J* is the earth connection. *H* is a coil having supported before it a mica diaphragm *I*, carrying a ring cut out of sheet copper or silver. *H* and *I* together form the mechanism which responds to the received waves and so reproduces the transmitted speech.

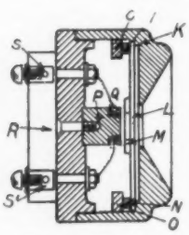


Fig. 3. Receiver.

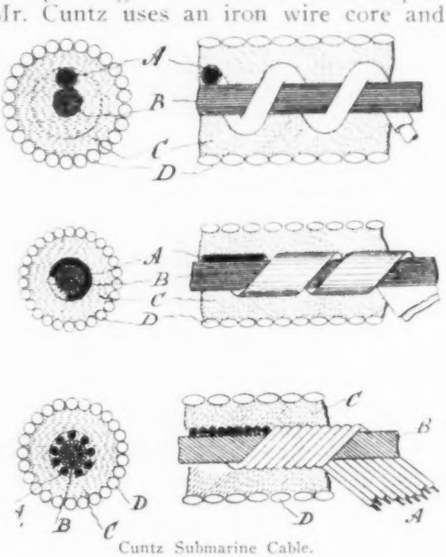
The responding device is shown by Fig. 3. Here *K* is a hard rubber shell in which the diaphragm *L* is placed. This diaphragm may be of mica and have shellacked to it a copper or silver ring *M*, or the diaphragm may consist of a simple copper, or preferably, silver disc. The diaphragm is clamped by the rings *O* and *N*. A hard rubber back *R* supports an ivory core *P* and screws into the shell *K*. In coil *Q* of fine enameled copper wire is wound in a channel around *P*, terminating at binding posts *S* and *S*.

In the operation of this "dynamometer telephone," high-frequency currents passing through the coil excite inverse currents in the diaphragm-ring *M*. There is, therefore, an attraction between the coil and diaphragm, and this attraction remains constant for a single value of high-frequency current. As the amount of radiated current varies, that of the received current must do likewise, and the value of attraction between the coil and diaphragm of the dynamometer telephone will change correspondingly. Therefore, the dynamometer telephone is a continuously acting receiver which gives responses proportional to the amplitudes of the received waves, and as such is capable of reproducing wireless speech.

In the speech-transmission test complete sentences were passed from sender to receiver over two and a quarter miles with the small power consumption noted above. Different persons' voices were recognizable, and on the whole, in spite of the extreme simplicity of the apparatus used, the results were very satisfactory.

The Cuntz Telephone Cable

A PATENT has been granted to J. H. Cuntz on a new form of submarine telephone cable which is designed to have its inductant balance its capacity, thus accomplishing the same end as the Pupin loading coil. Mr. Cuntz uses an iron wire core and wraps the conductor helically about the core as shown in the drawing. The three sketches indicate a variety of means of obtaining the same end. In each *A* is the conductor, *B* the iron core, *C* the insulation and *D* the armor. The inductance of the cable is balanced to its capacity by varying the dimensions of the core, conductors and space between them. The lower sketch shows a type of cable preferred by Mr. Cuntz for the reason that the core is wound helically as well as the conductors, the result being that the conductors cross the strands of the core approximately at right angles. The new type of cable is said to have been very successful in test trials in overcoming its capacity, which, as is well known, is the greatest obstacle to long-distance telephony by cable. In telephone practice the submarine cable is, of course, the most difficult prob-

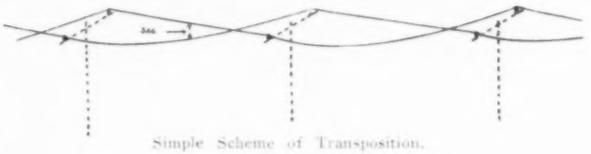


Cuntz Submarine Cable.

lem of any means of transmission, the reason being that it forms a condensor of very large capacity, whose outer coating is continuously grounded. Having met these conditions successfully Mr. Cuntz cable is, of course, adaptable for overland transmission as well.

Simple Transposition Method

A VERY simple transposition method is described in the *Electrical World* by P. F. Larned. According to the writer this scheme of transposing a pair of telephone wires at every pole of the transmission line along which they are carried is certainly so simple as to have deserved better attention from engineers

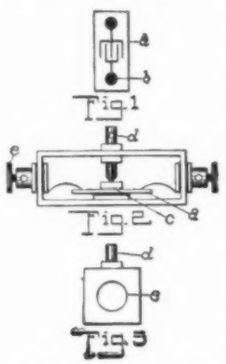


Simple Scheme of Transposition.

who design lines and use instead the unsatisfactory double-groove transposition insulator or four-insulator construction. The method consists in rotating the circuit by crossing wires between poles, allowing the lower wire several feet more sag than the other. In a line carried on pins three feet apart and hung in 600-foot spans, three feet difference in the sags of the crossing wires has proved an entirely satisfactory and permanent construction. The wires cannot swing together and make contact, for at the middle of the span, where the tendency to swing is greatest, the wires are correspondingly most widely separated. In a line of any length the unsymmetrical suspension of the wires is compensated since each wire occupies alternately the long and short sag position. The only provision to be made in using this construction is that the wires do not slip on the insulators or the latter rotate under the unbalancing action of the unequal spans, letting the wires get together.

Experiments With Selenium

SELENIUM'S peculiar property of varying its electrical resistance under the influence of light has made it of great interest to experiments with television and phototelegraphy, and it has found use in some telephonic devices. Years ago Prof. A. Graham Bell telephoned over a beam of light by using the selenium cell. Ernst Ruhmer, a chemist now at work in Berlin, utilizes the fact that the selenium cell is a conductor when exposed to light and so arranges his method of receiving and transmitting messages that he can talk at night with a man twenty miles away over a beam of an arc light.



Selenium Pressure Cell.

Selenium is a nonmetallic element, a by-product from the manufacture of sulphuric acid from iron pyrites, in final crystalline form, opaque to light and a dull gray color. It was discovered by Bertelius in 1817 and derives its name from the Greek word selene, meaning originally moon.

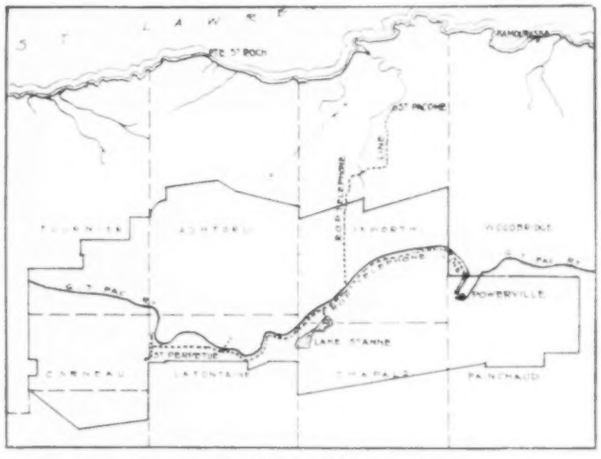
The usual method of making a selenium cell consists in pressing the electrodes against a piece of crystallized selenium, which decreases its resistance to an electric current, when submitted to the action of light. Very thin plates of selenium are necessary, as the action of light is limited to an extremely thin layer of the exposed surface (calculated by Marc to be about 1/500,000 inch thick). Moreover, selenium is rather fragile and being of high resistance, heavy pressure must be used in order to realize good contact.

A writer in the *Scientific American* discovered that selenium, when molten between a cold and a very hot glass plate, strongly adheres to the latter, after the crystallization. It is thus possible to cover a thin (1/250 inch) flexible glass plate with an exceedingly thin coating of selenium (1/1,000 to 1/30,000 inch) which has a highly polished surface that gives very good contact with the electrodes. These consist of gilt stripes on a glass plate (Fig. 1). There are from 250 to 2,500 electrodes on every inch. The following is a description of a cell actually made:

Working surface=¼ by ¼ inch.
Resistance in the dark=20,000 ohms.
Resistance in ordinary daylight=10,000 ohms.
Resistance in strong light=3,000 ohms.
Maximum intensity of current=0.0018 ampere.
Figure 2 gives a diagram of the cell.
Figure 3 is an end view of same.

An Extensive Private Line

AN extensive private telephone line just completed and operated by the River Quelle Pulp and Lumber Company, Quebec, Canada, is described in the *Canadian Electrical News*. The first line built, which has been in operation for over two years, runs for a



An Extensive Private Telephone System.

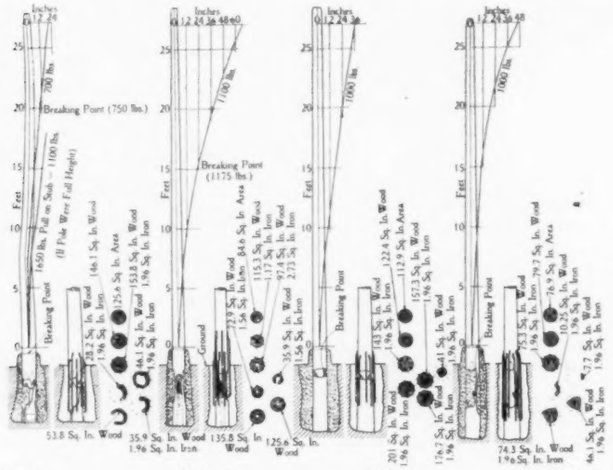
distance of ten miles east from Ste. Perpetue village, where it has a connection with the Kamouraska Telephone Company's wire. During the past summer, a line was built from the office in St. Pacome, the River Quelle and following the Ste. Anne colonization road to the National Transcontinental Railway, a distance of approximately 17 miles, and then following the right of way for approximately 2½ miles to Lake Ste. Anne Camp, where there is an instrument, and where the company keep two guardians during the summer season. From there the line continues west for about 9 miles until it connects with the original installation at Ste. Perpetue. Then, from the Ste. Anne road, the line also runs east, following the National Trans-

continental Railway right of way for a distance of 14½ miles, to the company's mill at Powerville, near the St. Phillippe road, where there are also two guardians during the summer season. The total length of the system is approximately 52 miles, shown in outline in the accompanying sketch.

These lines were constructed mainly for protection in case of fires. There are telephones as follows: one at St. Pacome office and one in the manager's house, with a special night bell to enable fire rangers to get in connection with headquarters at any time, day or night; also a main telephone at the camp at Lake Ste. Anne, one in the company's office at Powerville, and one at the camp at Ste. Perpetue. The intention is to have connections for portable telephones at every half-mile along the National Transcontinental Railway, and every mile along colonization roads. The company has tested several portable telephones, but the only one that gave good service is considered rather too heavy for rangers to carry. It weighs 14 pounds and is in a waterproof case, carried strapped on the back. If the company cannot get a portable instrument that will suit, it will install ordinary wall telephones every two miles along the railway.

Mending Poles with Concrete

THE method of repairing poles suffering from butt rot by means of concrete reinforcement offers many features of value, according to the *Electric Journal*. The illustration shows the general method of doing this work, but which is modified to meet the requirements of individual cases, and upon which patents were granted to Mr. R. S. Orr, who developed this process. The rods are of Bessemer steel, one-half inch in diameter and vary in length from four to six



Test of Poles Reinforced by Steel Rods and Concrete.

feet. One end of the rod is bent at a right angle; this short leg is driven into the solid part of the pole above ground level, while the other end is driven into the remaining sound butt. A 1-2.5-5 mixture of concrete is then thrown in around the pole, allowed to settle into the cavities and is finished off with a richer mixture at the exposed end above the ground. This upper end of the cast is given form and finish by the use of an adjustable form.

Several poles which had been in service from fifteen to twenty years and whose strength had become seriously impaired as the result of butt decay were carefully removed from service, reset and repaired by applying the foregoing method. Tests were applied to prove their strength after being thus repaired. In the cut poles 1, 2, and 4 have become weakened through butt rot, as shown by the cross-sections. Pole 3 is a new pole artificially weakened. After being reinforced, the poles were subjected to strength tests by applying a horizontal pull at a standard distance of 27 feet above ground. The point of failure, breaking load and deflections obtained are indicated for each case. Pole No. 1 broke under a strain of 750 pounds at a point 20 feet above ground, where it had been weakened by cutting a deep gain. The rope was then tied to the pole about 18 feet above ground, the failure occurring under a pull equivalent to 1,100 pounds applied at the standard height of 27 feet; the break occurred at the top of the reinforced collar.

Pole No. 2 was reinforced with a supplementary set of rods owing to a large cavity which extended both above and below the point of extreme decay. The rods were driven into the sound wood above the hollow part and about three feet from the ground. Under test this pole failed at a point 15 feet above ground, the test load being 1,175 pounds.

In each of the preceding cases the poles broke above the concrete reinforcement, but pole No. 4 began to fail under a horizontal load of 1,000 pounds at a point about four inches below ground level. The concrete broke, allowing the rods to be slowly pulled from the pole, with a gradually decreasing pressure to obtain further deflection. An interesting feature of this test was that the failure was gradual, and although the fault occurred in this case at the point of reinforcement and the concrete collar was broken, the pole was still strong enough to support the weight of the linemen and required the combined weight of three men to pull it to the ground.

For ordinary repairs the cost averages $3.50 per pole; it being increased, however, in case of isolated repairs and where more elaborate reinforcement is required, either for purpose of obtaining additional strength.

The inference drawn from the tests and other data obtained regarding this method of reinforcing poles by means of rods and concrete is that it gives reinforcement sufficiently strong to enable the pole to withstand a horizontal strain of not less than 1,000 pounds applied 27 feet above ground, and that it is but a question of increasing the number of rods and the amount of concrete to meet any required strength.

Kentuckians Plan Traffic Association

Representatives of 460 independent telephone companies of Kentucky, Southern Indiana and Northern Tennessee in convention at Louisville, December 20, discussed the importance of organization and co-operation among the various independent companies. President Coleman stated that a practical plan for organization and co-operation must be adopted or the fight o fthe independents would be lost.

The plan to incorporate the Kentucky Telephone Traffic Association was adopted, and a committee of five was appointed to work out the articles of incorporation and submit to the executive committee. The capital stock of the organization will be $100,000, of which only $10,000 will be issued at the beginning.

Automatic Apartment House Telephones

By Gerald Deakin

AT THE present time, the demand for private exchange service in apartment houses is almost invariably met by the installation of a manually operated private branch switchboard. Such switchboards require constant attention on the part of some one if continuous and uniform service is to be given. In the larger

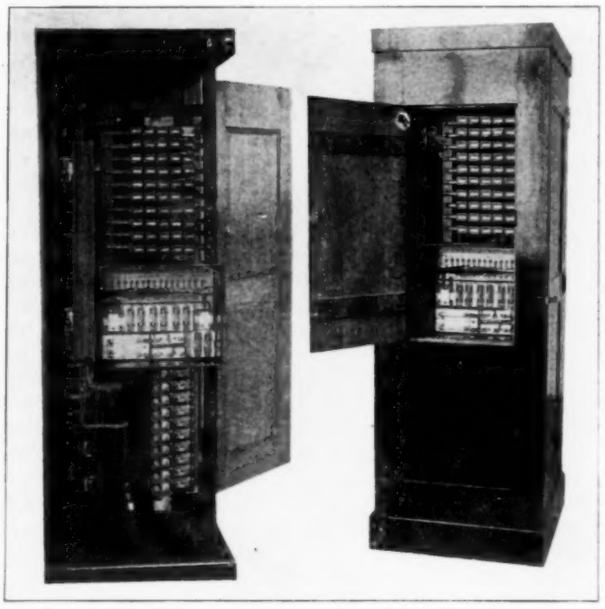


Fig. 1.—Front of Switchboard with Front Removed.

Fig. 2.—Front of Cabinet with Meter Door Open.

apartment houses the services of an exclusive switchboard attendant can be afforded and such an attendant is nearly always provided, but in the smaller buildings the expense of a switchboard operator is rarely warranted; therefore the switchboard gets its attention, such as it is, from the janitor, bell boy or elevator boy as the case may be. Attendants so incumbered by other work must of necessity be absent from the switchboard a large part of the time. In the best of apartment houses, private exchanges are rarely attended before seven or eight o'clock in the morning and after ten or twelve o'clock at night, thereby requiring doctors and others to whom continuous service is a necessity, to install additional facilities for telephone service.

Apartments are generally taken on short term leases or agreements, and it is, therefore, advisable and even necessary when the cost is considered, that all apartments be provided with some sort of a continuous telephone service; for by so doing the constant placing and removing of telephones, which would otherwise be necessary, is done away with. With all due respect to the ability and carefulness of installers, it may be said that their presence, as a rule, does not improve the appearance of the tinted wall or the finished woodwork, particularly if they have occasion to visit the same place more than once or twice. It is for this and other reasons occasioned by similar considerations, that apartment house owners have installed so generally manually operated private exchange switchboards.

In an endeavor to handle in a satisfactory manner this important class of service, the writer has recently devised and put into service in a modern automatic telephone plant, an automatic apartment house system, whereby the necessity of a switchboard attendant is done away with. Some of the salient features and advantages of the system will be stated briefly.

1. An ordinary automatic telephone set without coin or other special attachment, apart from the calling device, is placed in each apartment.

2. Outgoing calls are made direct from the apartments without the aid of an operator. Each completed exchange call is recorded upon a meter forming part of the automatic switchboard installed within the apartment house. Calls to the telephone company for information, etc., are not recorded upon the meter.

3. The apartments are called direct from the outside, no attendant being required to distribute the calls at the apartment house.

4. A local call telephone, situated in the public office, janitor's quarters or the landlord's quarters, as the case may be, is installed in each apartment house. This telephone may be called by the occupants of the apartment house without cost to them. The telephone is for local service only and cannot be called from the outside, nor can calls to the outside be made from it.

5. Each apartment has twenty-four hour service, thereby eliminating slow or impossible connections.

6. Each apartment is afforded automatic secret service equivalent in every respect to main line automatic service.

7. The automatic switchboard need not be placed

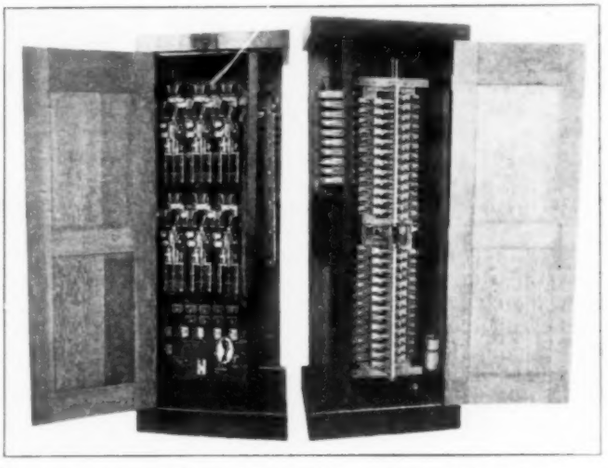


Fig. 3.—Connector Side of Switchboard.

Fig. 4.—Line Switch Side of Switchboard.

in the office, corridor or other conspicuous place where space is limited. It can be placed in any convenient and dry location.

8. The expense of the services of a switchboard attendant is not entailed.

The small automatic switchboard installed within the

apartment house consists of a combination of lines, switches, connectors, service meters and a fuse panel, all suitably mounted in a substantial cabinet. The front elevation of a fifty line cabinet with the meter door open is shown in Fig. 2. The service meters are mounted in strips just above the switches and fuses controlling the current supply. The fuse and switch equipment is placed in a fire-proof compartment. The meter door permits the reading of the meters and the manipulation of switches and fuses, but does not allow access to the remainder of the automatic switchboard. A front elevation of the switchboard with the front door of the cabinet removed is shown in Fig. 1. The terminal strips to which the house and trunk lines are attached are shown to the left of the service meters and fuse panel. The line switch side of the switchboard is shown in Fig. 4. The switchboard shown in the cut has capacity for fifty line switches, each of which, by means of a master switch, has access to any one of a group of six outgoing trunks. The opposite side of the switchboard is shown in Fig. 3. Here are mounted the incoming trunk connectors, out trunk relays and at the very bottom the miscellaneous relays controlling the supervisory and ringing circuits.

At the central office, the incoming trunks from the

Fig. 5.—Public Telephone with Coin Machine.

Fig. 6.—Local Call Telephone.

apartment house switchboard terminate on line switches precisely as any other line in a modern automatic telephone system of the present commercial type. The circuit at the apartment house is so arranged that upon the removal of the receiver from the switch-hook, the corresponding line switch on the apartment house switchboard automatically picks up an idle outgoing trunk to the central office and in turn causes the line switch, associated with the trunk at the central office, to automatically select an idle first selector. The calling subscriber is now connected to the automatic switchboard and may proceed to call the desired party in the usual manner. When the called party answers, the circuit conditions in the line are changed so as to cause the service meter at the apartment house to operate and register one additional call upon its counting train. At the end of conversation, the calling subscriber hangs up and releases the connection.

In listing automatic apartment house systems in the directory, the telephone numbers are divided into two parts, as for example, C-5517-43. The first part of this number, namely C-5517, pertains to the apartment house and the latter part, namely 43, to the individual apartment and where possible coincides with the apartment number. To call the apartment whose telephone number is that just given, the calling subscriber calls C-5517 in the usual manner, and in so doing automatically selects an idle outgoing trunk circuit leading to the apartment house, there terminating the partially completed connection upon a connector. This connector differs in no way from the main line connectors used in the associated central office. The calling subscriber may now complete the connection by calling the digits 4 and 3 in the order given. When this is done the call bell in apartment 43, or whatever apartment corresponds to the number 43, will ring until the call is answered, or until the calling subscriber hangs up.

From what has been said, it will be seen that the service afforded by the automatic apartment house system is essentially equivalent to main line service, differing only in the fact that two additional digits are involved on incoming connections.

In placing this system in large apartment houses, it is generally possible to make the last part of the apartment house telephone number agree with the actual number of the apartment. Where, however, a group of small apartments are to be served, it is desirable that one switchboard be made to serve the group. Such an arrangement requires that the second part of many of the telephone numbers differ from the apartment number. Where this is the case, the objection to the difference in numbers is overcome by listing in the directory, under the apartment house, all the apartment telephone numbers. For the information of the public the telephone company keeps an up-to-date list of the occupants of all apartments in every apartment house equipped with automatic service. In this manner, the information bureau of the telephone company removes the burden of inquiries from the management of the apartment house.

The switchboard previously described makes use of separate incoming and outgoing trunks. The automatic system, however, can be readily adapted to the use of double track, two wire trunks, that is, to the use of trunks over which both incoming and outgoing connections can be made. This system can be further adapted to give free intercommunication between apartments and some one point within the apartment building, as for example, the office, landlord's or janitor's quarters, and where desirable, between the various apartments in the building. To make a call from an apartment to the local office, landlord or janitor, as the case may be, an arbitrary number, such as C-05 is called. This causes a lamp to burn on the local telephone which is shown in Fig. 6. This telephone, as will be seen, is equipped with a key of the common intercommunicating type, having six buttons, one for each outgoing trunk circuit. Adjacent to each key is a lamp socket suitably mounted. Should the call to the local station happen to be made on out trunk number 2 for example, the lamp opposite button number 2 on the local telephone will light, and at the same time a buzzer will sound. The called party in answering depressess the button opposite the lamp burning and removes the receiver from the switchhook, thereby extinguishing the lamp and causing the audible signal to cease. The keys are of the automatic release type, that is, depressing one key will automatically release any other key that may happen to be depressed at that time. The local telephone can be connected with the out trunk circuit only when a lamp burns. In this manner secrecy is secured on all

connections. It should be stated that in calling C-05 as mentioned, a connection of three numbers is not actually established. On the contrary, the automatic apparatus at the central office upon picking up the called number which would bring the partial connection to a third selector, is at once released and the out trunk circuit at the apartment house is automatically cut off from connection with the central office and in place thereof, connected to the local office telephone, with the results stated. The circuit thus arranged does not tie up any central office switching apparatus during local connections within the apartment house. Free intercommunication between apartments is accomplished in practically the same manner, except that the apartment telephone number is also called, as for example, C-05-43. This number called would connect the calling apartment to the apartment whose telephone number is 43.

The system as installed and working permits the use of coin machines. A telephone so equipped is shown in Fig. 5.

The current for the operation of the switchboard is obtained from a battery of twenty-four small storage cells, the whole floated across a pair of wires from the central office or across the local direct current lighting mains if such exist. In either case, if the potential of the charging circuit used is 110 volts, a bank of lamps is used to reduce the current to the required value. By floating the battery in this manner, the potential of the current supply at the switchboard is kept approximately constant. The battery is mounted in a substantial oak carrying case and is practically fume proof and for this reason may be placed in any convenient location without objection. At intervals of every six months or less, it is the intention of the telephone company to replace all portable storage batteries by fresh ones, and bring the old ones in for overhauling, after which they will again be placed in service. The changing of the batteries involves merely the labor of removing four wires from the terminals of one battery and connecting them to the terminals of another. Where a number of closely adjacent switchboards exist one battery will suffice for the group.

The automatic switchboard may be placed in any convenient location, providing it is reasonably dry. It has been found that an automatic switchboard may be placed without trouble in the finished basement of the average modern apartment house. It is recommended, however, particularly in new buildings, that the switchboard location be arranged for near the wiring center, for by so doing the amount of room wire required is reduced to a minimum and the switchboard is placed above the first floor.

The new system being on a measured service and coin machine basis, makes it possible easily to arrive at terms which are agreeable and beneficial to both the telephone company and the proprietor of the apartment house. The elimination of the switchboard attendant is one feature in the new system that appeals strongly to the lessee.

The demand for automatic private exchange switchboards for general use has long been felt and the advent of such switchboards into many classes of business is bound to result in the next few years, notwithstanding J. J. Carty's statement to the contrary as given in this paper on "Telephone Service in America," read before the International Conference of European Telephone and Telegraph Administrations. It is hoped that in the future the companies manufacturing automatic apparatus will take a more active interest in this important phase of telephone service, and thereby provide the telephone companies with apparatus less costly and better suited to the special requirements of private exchange service than that now obtainable. In conclusion it may be said for the benefit of those who think otherwise, that the automatic switchboard mentioned in the preceding paragraphs is working satisfactorily, without being attended by a so-called "mechanician operator."

Iowa Companies Do Not Need Franchises

Telephone companies in Iowa may construct telephone lines in Iowa cities and towns without first securing a franchise, according to a decision handed down by the Supreme Court in the case of the East Boyer Telephone Company vs. the Town of Vail. It was written by Judge McClain. Judge Weaver dissented and in his dissenting opinion declared that the decision "takes away from cities and towns the right to control their own streets and to exclude therefrom telephone lines for which there is no public necessity," and that "I am opposed to this nullification of the statute by violent construction."

Injunction proceedings to prevent the town of Vail from interfering with the construction of telephone lines in that town by the East Boyer Telephone Company were started in the district court of Crawford County by that company. The town filed an answer stating that the company had started to build its lines through the town without first securing a franchise. A demurrer was filed by the plaintiff and a decree for the company resulted.

In affirming the lower court Judge McClain held that there is no occasion for cities and towns to grant franchises to telephone companies in Iowa, and that the companies have the right to construct lines without such franchises according to the statutes.

The Latest Ohio Telephone Bill

A bill providing for a telephone commission in Ohio is shortly to be introduced into the state legislature. The bill has been endorsed by the directors of the Ohio Independent Telephone association, and will provide for a committee of three persons who will serve for two years. At the end of that time the duties devolving upon the commission by the bill will devolve upon the railroad commission of Ohio, or upon the general utility commission, if one shall in the meantime be created by law. The bill provides full protection for the public of Ohio and provides that the telephone companies may consolidate.

Now it is St. Joseph, Mo., which claims to have more telephones, according to population, than any other city in the world, so far as available statistics show. This condition has prevailed only during the past few months, when a campaign for subscribers has been made by the telephone companies. There are about fourteen telephones in St. Joseph for every one hundred persons. In New York the proportion is eight to one hundred inhabitants, in Philadelphia and Chicago about the same, and in London it is only between two and three.

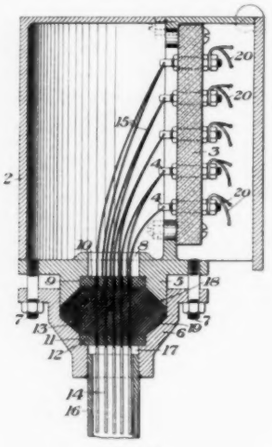
The Missouri & Kansas Telephone Company made a campaign for 10,000 telephones, and the number soon reached 10,100. To celebrate this event the company gave a banquet to its officials.

Recent Telephone Patents

By David S. Hulfish

965,257. Attachment. W. H. Waldron and L. R. Krumm, San Francisco, Cal. An antiseptic mouthpiece cover, comprising a paper shield attached by gripping one edge between mouthpiece and transmitter case and hooking the other edge over the mouthpiece.

965,453. Meter System. C. W. Greenslitt, Cleveland, Ohio, assignor of parts to A. C. Morse and C. F. Saenger of same place. Call counters are provided at the telephone stations, and the connecting cord pair has a time limit at which it disconnects the lines, as a conversation length limit for one registration of the telephone station meter. The party calling may reestablish connection by operating his meter to register another call.



965,684.

965,684. Terminal Box. Fred N. Bierce and Edward T. Jones, Pittsburg, Pa., assignors of one-third to C. W. Gerwig of same place. In the illustration, 16 is a lead sheath cable containing conductors 14, which pass through holes in the rubber disk 13. The disk 13 then is compressed by means of the bolts 7 and 7, compressing upon the conductors and forming a weatherproof seal.

965,748. Combined Telephone and Telautograph System. Foster Ritchie, Acton, England.

965,793. Selector. W. W. Alexander, Kansas City, Mo. The selector responds only to battery signals in which a proper sequence of long and short currents are contained. The driving armature drives the selecting disk in a selective manner for long and short current impulses, and stations upon a line may be called by a code similar to a Morse telegraph code.

965,833. Peg Counter. C. H. North, Cleveland, Ohio, assignor to North Electric Company of same place. A counter for each operator's position at a switchboard is energized to register each time a supervisory lamp of an answering plug is lighted or extinguished.

965,877. Relay. Oliver C. Dennis, Chicago, Ill. Line and cut-off contacts are actuated by a single armature set as a core between two solenoids, line and cut-off respectively.

965,876. Telephone System. Oliver C. Dennis, Chicago, Ill. A system based upon the use of the combination relay of patent No. 965,877, the relay being used both in line and supervisory positions of the circuits of the system.

965,973. Trunk. C. S. Winston, Chicago, Ill., assignor to Kellogg Switchboard and Supply Company of same place. Signals are "permanently attached to each end of the trunk"; both are displayed when the A-operator connects, the A-operator's signal being then under control of the called subscriber, and the B-operator's signal being under control of the A-operator.

965,976. Signal Transmitter. J. L. Wright, Washington, D. C., assignor to North Electric Company, Cleveland, Ohio. A power-driven signal transmitter for controlling automatic telephone line switches. A detail for the automanual system.

965,992. Electrical Condenser. W. W. Dean, Elyria, Ohio, assignor to Dean Electric Company of same place. A strip of paper is coated on one side with fine conducting particles and wound into a roll with a strip of metal foil. The paper is adapted to act as an insulator at low voltages and to be punctured at high voltages, the fine particles being dissipated upon the occurrence of the puncturing.

966,013. Telephone System. C. E. Hague, Rochester, N. Y., assignor to Stromberg-Carlson Telephone Manufacturing Company of same place. The claims read upon the specific arrangement of ringing relays in a trunk system.

966,247. Receiver. Edward Schwartz, Antwerp, Belgium, assignor of one-third to E. E. Clement, Washington, D. C. A telephone receiver having a metal-lined shell.

966,467. Receiver. K. and I. W. Nichols, Newark, N. J. A sound-wave controlling cap for a telephone receiver.

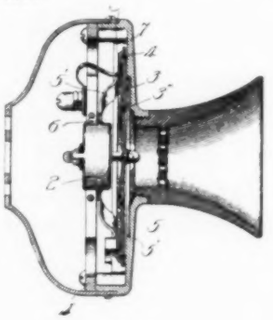
966,486. Attachment. Robert W. Talley, Clarendon, Texas. In a writing shelf for attachment to a telephone, an arrangement of paper supply chambers and a carbon sheet enables duplicate records to be made conveniently.

966,534. Transmitter. Frederick M. Durkee, Newton, Mass., and Josiah B. Millet, Boston, Mass., assignors to Submarine Signal Company, Waterville, Maine. While this device is electrically a telephone transmitter it is specifically a receiver for sound waves through the water. The novel feature is found in the arrangement of a resonance chamber in the sound-receiving casing.

966,655. Protector. Frank B. Cook, Chicago, Ill. A combination of fuse, heat coil and arrester for the central office distributing frame.

966,733. Meter. Albert M. Bullard, New York, N. Y., assignor to Western Electric Company, Chicago, Ill. In a system requiring the application of a higher potential for registration purposes to a wire already connected with a potential which may have either polarity this invention provides the selection between two high potentials of different polarities by means of a polarized relay controlled by the polarity already existing upon the circuit to be served.

966,764. Relay. Herman Poser, Hermsdorf, Germany, assignor to Western Electric Company, Chicago, Ill. The relay spool has two armatures, responsive to different current strengths, one operating to close a contact and the other to open the same contact. A combined line and cut-off relay with a single contact.



967,217.

966,809. Meter. Oliver C. Dennis, Chicago, Ill., assignor to Western Electric Company of same place. The meter is placed at the telephone station and may be operated by the telephone user to register for each call or may be controlled by the central office to permit operation without registration as a credit for a registered but lost call.

967,204. Telephone Set. Oscar M. Leich, Genoa, Ill., assignor to Cracraft-Leich Electric Company of same place. A specific arrangement of parts in a magneto wall set.

967,217. Transmitter. H. S. Mattison, La Crosse, Wis., assignor to Vote-Berger Company of same place. A trans-

mitter of the granular carbon type. The novelty is found in the grooved diaphragm and the resilient gasket held in the groove between the diaphragm and the case.

967,276. Microtelephone. John N. Wallace, La Crosse, Wis., assignor to Vote-Berger Company of same place. The handle member of this device is composed of two half tubular parts held together by two binding members.

967,409. Signal System. W. F. Mikolasek, Scotland, S. D., assignor of parts to J. F. Schmidt, F. L. Wheeler and P. O. Stonebraker of same place. A system for party lines. When two stations are in conversation, a third, on lifting his receiver, will give an audible signal to the two engaged in conversation. The claims are very specific to the device as built.

967,438. Attachment. F. E. Richardson, Cazenovia, N. Y. An index attachment for desk portable instrument.

967,475-6. Telephone System. C. S. Winston, Chicago, Ill., assignor to Kellogg Switchboard and Supply Company of same place. In these two patents the four relays of the Kellogg cord circuit are included in the talking wires. One patent shows repeating coil and the other condenser circuit.

967,692. Lockout Telephone System. Harry G. Webster, Chicago, Ill., assignor to Kellogg Switchboard and Supply Company of same place. A party line using the harmonic system of signaling is shown. A relay at each station, holding the transmitter in circuit when battery current is upon the line, will act as a lockout device to prevent interruption by other stations on the party line.

967,719. Listening Attachment. W. E. Burt, Yuba, Wis. A latch on the escutcheon plate allows the hook to rise far enough to close the circuit through the receiver but not through the primary coil of the telephone station, giving listening conditions without permitting local noises upon the telephone line.

967,747. Mouthpiece. O. F. Falk, Belleville, N. J., assignor to National Dictograph Company. The mouthpiece is a cone and has a conical obstruction within it.

967,748. Dictograph Apparatus. O. F. Falk, Belleville, N. J., assignor to National Dictograph Company. A specific arrangement of telephone parts for office convenience in using the Dictograph system of apparatus.

967,773. Intercommunicating System. N. H. Holland, Chicago, Ill., assignor to Western Electric Company of same place. In an intercommunicating system having trunks to a common battery exchange, an arrangement of circuits is provided for maintaining the circuit continuity of the trunk line for controlling central office signals while performing service conditions at the substation telephone.

968,231. Receiver. R. J. Barber, Belmont, Mass., assignor to Globe Ear-Phone Company, Boston, Mass. The receiver cap is adjustable for regulating the intensity of the sound received.

968,395. Protector. F. R. Parker, Chicago, Ill. An arrester for central office in which the operation of the heat coil separates the carbons, thereby tending to clean them before resetting.

968,396. Telephone System. C. T. Patterson, Albany, Ore. A lockout selective party system for private party lines. The selecting device at each station is of the step-by-step type, and all may be operated from any station.

Reissue 13,146. Transmitter. W. E. Harkness, East Orange, N. J., assignor to Dean Electric Company, of Elyria, Ohio. A transmitter of the granular-carbon type. The novelty is found in the specific arrangement of mounting parts for the electrodes.

The Law and the Telephone

By E. J. Wenner

SPECIAL MASTER'S REPORT ON RATES, EARNINGS AND DEPRECIATION.

IN the rate case pending in the Federal Court of Louisville, Ky., between the general council of Louisville and the Cumberland Telephone and Telegraph Company, mention of which has been made in these columns, the report of Judge Burnett, the special master appointed to investigate the facts, has been filed.

The report is authority for the plant valuation of $1,381,000, while it is claimed by the company that it represents a total outlay of $1,701,000. The company claims in the bill of exceptions filed to the special master's report that telephone property such as is maintained by it, ought to earn at least 10 per cent profit.

The Cumberland Company claims to have paid out of its own funds large debts owing by the Ohio Valley Telephone Company, which latter company was purchased, and is now a part, of the Cumberland company, and its value is included in the figures named above, and that the debts of the Ohio company represent a part of the cost of the plant as it now exists.

Witnesses were used touching upon the value and the cost of the plant, and one at least valued the assets of the company at $1,771,000. The Cumberland Telephone Company insists that the master should have added to the cost of reproducing the plant the value of its franchise, the cost of securing business, supplies, office furniture and fixtures, and claims that such properties were included in the report of the Chicago Telephone Commission in an estimate of the cost of the plant or reproducing the plant.

There is contention as to the amount of earnings for long distance tolls, and in the master's report he finds that 15 per cent of certain calls is not adequate allowance to the Louisville exchange, and that the latter should take all of said earnings. This would be obviously untrue, for if a plant should be credited with all of the toll earnings there would be resultant loss to the other commnecting plants.

The special master reports a 7 per cent depreciation, which includes certain operating expenses and maintenance charges. The telephone company insists that the allowance for these causes is not sufficient, and insists that operating and maintenance expenses should be considered separately from ordinary depreciation.

The company's claim that its property should earn at least 10 per cent is controverted by the city. In substantiating its claim the company has cited two of the witnesses for the city, one of which has said that the proceeds should be not less than 10 per cent, and the other not less than 8 per cent. In addition the report of the New Orleans Board of Trade Committee was used showing a recommendation that the company be permitted to earn 10 per cent net on its investment. The report of Merchants' Association of New York was also considered in which the following language is used:

The telephone business demands a continuous accession of fresh capital to satisfactorily serve the public. Having in view the importance to the public of constant improvement and expansion and the greatest possible efficiency of telephone service, as well as the necessity of offering an attractive investment to new capital to provide for such expansion, it is the opinion of this committee that to provide a fair return on capital actually and neces-

sarily invested and a proper allowance for contingencies ten per cent margin above operating outlays is a reasonable and proper margin in the telephone business. In the various movements hitherto made for the limitation by law of telephone profits, wherever the permissible percentage of profit has been dealt with, this margin has been accepted as a proper one. It has been specified by law in the case of some other public-service corporations.

Judge Evans has consulted with the attorneys for the Cumberland Telephone and Telegraph Company with reference to certain matter in briefs yet to be filed. These now relate to the present value of the plant of the company and the question of the crediting of toll rates for long distance messages to the local office.

INJUNCTION STOPS POLE CHOPPING.

At a recent meeting of the council of Atchison, Kan., it was reported that the Atchison Telephone Company had erected a pole in a certain location without first getting a permit from the city, and as the company had been notified that it must secure permits before erecting poles, the mayor ordered the street commissioner of the city to chop the pole down.

In the meantime, the president of the telephone company instituted an injunction suit, contending that the company had not exceeded the terms of its franchise, and succeeded in securing a temporary order enjoining the city of Atchison from cutting down the poles of the company or interfering with its property in any way.

HEAVY DAMAGES ASKED FOR LOSS OF TIME IN ANSWERING CALLS.

C. L. Holtze has brought suit against the Cleveland Telephone Company, Cleveland, Ohio, for the sum of $26,000.

The plaintiff claims that he is an attorney at law and a subscriber of the company. He alleges that the operator failed to respond to calls and to rectify mistakes. He also claims that he was called to the telephone many times by the ringing of the bell, and was informed that there was no call for him. For the time he alleges to have lost by mistake in calls he asks the sum of $1,000, and for damages on account of lack of service he asks $25,000. This case will be watched with a great deal of interest by those who have fancied grievances against telephone companies.

FRANCHISE—ORDINANCE—RESOLUTION.

The East Tennessee Telephone Company has brought action against the city of Frankfort, Ky., claiming that the ordinances passed by the council fixing a penalty for doing business without a franchise, and providing for a sale of franchise for telephone exchanges are void and of no effect. It is also claimed that a resolution passed by the council in 1881 authorized the telephone company to use streets for its poles and wires is in effect a franchise so long as there was no law then requiring a special franchise.

The city of Frankfort relies on a former decision of the Court of Appeals, in which a similar resolution was held to be of no value as a franchise, and conferred no authority upon the telephone company, except to use the streets as it provided.

SHOCK CAUSES INJURY—SUIT FOR DAMAGES.

Alphonso Sentmen, of near Dayton, Ohio, has brought suit against the Home Telephone Company for $1,000.

Sentmen claims his father was a subscriber to the Home Telephone Company on a line running out of Centerville, and that on an occasion their telephone acted badly and it was discovered that an electric wire of the Dayton and Xenia traction system had fallen across the telephone wire, causing the trouble. The plaintiff reported the matter to the telephone company, and was directed by the manager to take an axe and cut the ground wire at his home. In some manner, while engaged in cutting the wire, he got hold of it with his hands, and received a severe shock. He was laid up for two weeks, and now claims the company negligent and sues for damages.

REFUSES TO PAY EXPENSES FOR SPECIAL ELECTION.

There are new developments of more than ordinary interest in the litigation between the Ozark Bell Telephone Company and the city of Springfield, Mo. This case has been pending for a long time, and many efforts have been made to settle the controversy without extended litigation, but all have been thus far unsuccessful.

The history of this case is that an ordinance was passed by the city council requiring the telephone company to furnish single line business telephones for $30 per year, and it is claimed by the company that these rates are not sufficient to yield the company a profit. The telephone company had been charging more than the ordinance contemplated, and after the passing of the ordinance an injunction was secured enjoining the city from putting into force the proposed rates provided by the said ordinance.

The matter was referred by the court to Judge Willard P. Hall, Kansas City, Mo., who, after a thorough investigation, found that the rates prescribed were not sufficient to pay the expense of maintaining and operating the property, to say nothing of earning a profit, and that the enforcement of the ordinance would ultimately result in bankruptcy of the company.

Judge Hall has recently made his report and Judge John C. Pollock of the Federal Court has ordered that the city council of Springfield pay Judge Hall a fee of $2,000 for his services. A similar order has been made on the Ozark Bell Telephone Company, it being understood that the party to whom the costs are finally taxed shall pay the entire fee. The fee had been agreed upon before the testimony was taken in the Federal Court.

It is rumored that the condition of the Springfield city treasury will hardly justify the immediate payment of $2,000 to the special master.

The telephone company has offered to compromise the difficulty by taking $36 per year for single line business telephones, and $22 per year for single line residence telephones. To this offer the city has proposed that a special election be held, the costs to be paid by the telephone company, at which telephone users should have the right to vote on the compromise offer. The telephone company has refused to pay the expense of such an election, and takes the position that the city council should settle this matter without submitting it to the telephone users of the city at a special election.

It seems that the city council does not desire to settle this matter on its own responsibility, but wants to shift the burden to the telephone users of Springfield. It is an interesting proposition and the final result will be looked forward to with much interest.

Some Questions Answered

By J. C. Slippy

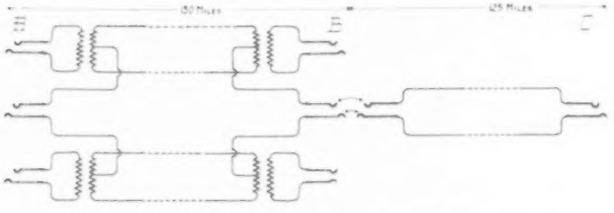
[This department is at the command of our readers. Questions relating to all branches of telephony—technical, financial, ethical, or otherwise—are invited, and will be answered in the order received. Answers by mail, if requested. Names of inquirers will not be used unless desired.—*Editor.*]

PHANTOM CIRCUIT.

1. Suppose I have four wires starting at *A*, say, and two of them end at *B*, which constitutes one telephone circuit. The other two extend on 125 miles to *C*, which is the end of that circuit. Now can I successfully obtain a third circuit between *A* and *B*, or will it be impossible on account of one wire being 125 miles longer than the other, and thus throwing them out of balance? I am drawing a sketch to illustrate. The wire is 210 pound copper transposed every one-fourth mile and is used for train dispatching. I understand that if this could be worked I would have to make a special transposition between *A* and *B* so as to work the third circuit. Also would No. 37-*A* repeating coils work satisfactorily in this circuit, which are so much used now in this work?

2. I have several telephone lines made up of one No. 12 iron and one No. 9 iron transposed every half mile, and the reason for these two sizes of wire is that we first had a No. 12 wire and ground return and decided to make metallic, and so strung a No. 9. Now these lines are noisy, which can be expected, as one is higher resitance than the other and this unbalances the line. They are strung on poles where there are eight other through telegraph wires, which gives us most of the noise by induction. My plan was to insert a non-inductive resistance in series with the No. 9 at each end, and thus equalize the two conductors and eliminate a great deal of this noise. Do you think that would work satisfactorily? If not give me a better scheme.—W. R. J.

YOU can install a phantom circuit on your line between *A* and *B* by placing No. 37-A repeating coils or their equivalent at *A* and *B*. The most efficient method of arranging the circuits will be as shown in the figure, in which the additional length of circuit (125 miles) is treated as an extension of the phantom circuit. Straight circuits should ordinarily be connected to the phantom, as the side circuits are less efficient. If installed in this way, the additional length of wire from *B* to *C* will have no effect on the



phantom. It will be necessary to make special transpositions on the line, the spacing of these transpositions depending upon the pin positions occupied by the circuits.

2. The noise on these lines is undoubtedly caused by induction, and will be remedied by installing a non-inductive resistance in series with the smaller conductor, as you suggest.

ANOTHER PHANTOM CIRCUIT.

I herewith inclose a sketch of our lines and would be pleased to have you give us all the information you can about connecting up a phantom circuit.

We have one line, or circuit, No. 2, which connects with switchboard No. 1 and has twelve 1,600 ohm telephones connected.

We have another line, No. 12, with seven 1,000 ohm bridging telephones connected. We would like to connect up a phantom circuit on those two lines between switchboard No. 1 and switchboard No. 2. The line wire used is No. 12 B. B. iron on all circuits. As you will notice on the sketch, line No. 2 does not go as far as switchboard No. 2; now can we put a resistance coil on the end of this line and run a single wire on into switchboard No. 2, so as to get the phantom circuit, also connecting a coil on the No. 12 line at switchboard No. 2?

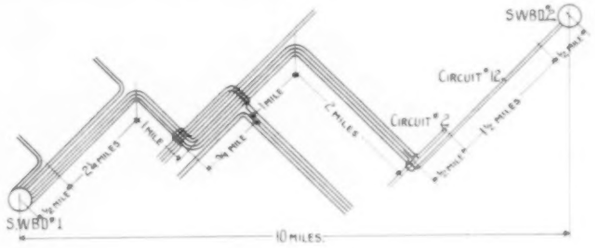
What resistance would you recommend for the coils for the phantom circuit?

Would the No. 400 arrester be a safe protection from lightning for the phantom coils?

How often should a phantom circuit be transposed?

What size resistance wire should be used in winding coils for this phantom circuit?

BEFORE attempting to connect up a phantom circuit, it is necessary to have at least two similar metallic circuits. The phantom is obtained by using, for each side of the third or phantom circuit, the two wires of a metallic circuit in multiple. Specially balanced repeating coils are placed one at each end of the two metallic circuits, and the third circuit is taken off from the mid-points of the line windings of these



repeating coils. In other words, to apply a phantom circuit to the case given, circuit No. 2 would have to be extended as far as switchboard No. 2, and the phantom derived from circuits No. 12 and No. 2. We would not recommend the installation of a phantom circuit in this case, as it would be more economical to connect your telephones to the new line extension, than to go to the expense of connecting up a phantom.

Where you intend to install a phantom circuit on lines having several telephones connected, the number of telephones should be divided equally between each side of the phantom circuit in order to preserve its balance. If you extended circuit No. 2, and installed the phantom circuit, three of the seven telephones should be placed on circuit No. 2 and the other four on circuit No. 12.

The repeating coils used for this work should be obtained from any of the telephone manufacturing companies, as it is impracticable to make them.

The transposing of bracket lines should be accomplished by transposing each pair every 5,200 feet, the transpositions of one pair being 2,600 feet from the transpositions of the other pair. The transpositions to be followed for phantom circuits on cross-arm lines depend on the pin positions occupied by the side circuits, and vary so greatly that it is impossible to describe them in this department.

The line wires used for the two side circuits must be of the same kind and gauge.

INTERCOMMUNICATING TROUBLE.

About six weeks ago we installed in a local factory 1,000 feet of eleven-pair interior or switchboard cable with eighteen magneto intercommunicating telephones connected. We used one conductor for each telephone and used a water-pipe system for a common return.

These telephones for the most part seem to ring all right, but the transmission is very poor. Can this be due to high electrostatic capacity, using but one conductor in the cable for each telephone? Would it improve matters if we substituted in place of the water-pipe return, one of the spare conductors in the cable for the common return, or will it be necessary to make all circuits metallic?

Inclosed find stamped envelope. Will you kindly write us as soon as possible what you think our trouble is and suggest a remedy for same, as we do not know just what to do to satisfy our customer.—H. C. M.

YOUR trouble seems to be in using the water pipe for a common return. We would suggest that you try using a conductor in the cable for the common return, and if this does not prove satisfactory, it will be necessary to make all circuits metallic.

MORE ABOUT PHANTOM CIRCUITS.

Kindly give some references, either in the trade journals or in some of the books on telephony, on the installation of phantom circuits. We have been able to find but very little on this subject and we would appreciate any information you can give. We would like to know particularly what is the result of installing a phantom circuit on a party telephone line where there are several instruments between the two phantom coils.—H. R. D.

THE phantom circuit is a name given to an auxiliary circuit upon a metallic telephone line, the two wires of the line constituting the main or similar circuit when taken as going and returning wires respectively. Upon such a line a phantom circuit is constructed by using both of the wires as the going side of the line and using earth or another circuit as the returning side of the phantom line. The methods of connecting the two wires of the physical line for the purpose of phantoming are shown in the book "How to Read Telephone Circuit Diagrams," by David S. Huefish.

It is immaterial whether the line phantomed has bridging bells or not, or whether the bridging bells be at the ends of the line, or at intermediate points or not, or whether the bells have the condensers in series or not. With a party line having several instruments between the two phantom coils the party line station must operate through grounds. Grounded ringers cannot be used nor can grounded signaling be used in the manner in which it is used frequently to enable farmers' lines to call the central office without signaling each other. The bridging ringers become either ordinary or harmonic without causing trouble to the phantom circuit.

Telephones in South Africa.

Consul Edwin N. Gunsaulus, Johannesburg, says that the entire telephone business of South Africa, so far as operating and maintaining it is concerned, with the exception of the system at Durban, Natal, which is owned and operated by the municipality, is in the hands of the government, and just at this time it is very difficult to make any definite statement as to the prospects for future telephonic development.

Up to May 31, 1910, when the South African Union went into effect, the systems of telephone were controlled by the administration of the four South African colonies, viz, Transvaal, Cape Colony, Orange River, and Natal. Control is merged into the Union government, the technical side being looked after by one chief engineer. This engineer has not yet been appointed and probably will not be for some months. Until this appointment is made it can not be ascertained what the policy will be, either as to system or development.

At the beginning of the present year there were approximately 12,320 telephones in use in the four colonies of South Africa, divided as follows: Transvaal, 4,400, of which 3,000 were in Johannesburg; Natal, 2,660; Cape Colony, 4,600; Orange River, 660.

Up to this time it has been the practice of the several governments to place orders for telephones and telephone supplies through the agents general in London, but it is thought this practice will be discontinued under the Union government, wholly or in part, and that, instead, more public tenders will be called for. Upon local authority, the telephone system in Cape Colony is now regarded as obsolete and a large amount of reconstruction work will be necessary shortly. This business, as in nearly all of South Africa, has been given heretofore almost entirely to a Swedish firm, which has representatives in Johannesburg and other South African towns, and this firm's system of telephones is generally in use in the country.

Telephones in Haiti.

Consul John B. Terres, Port au Prince, states that the Haitian government only has a telephone attached to the land telegraph, for its own use.

The telephone system in Port au Prince was established in 1890, with some 300 subscribers paying $5 monthly. It was not long before the service got out of order and the number of subscribers gradually diminished until it was entirely suspended. It is again being put into operation and new terms are being made with the government in hope of getting up a satisfactory service.

There have been granted by the government other concessions for some few of the smaller cities on the coast, but the result has been the same, none continuing in operation.

Telephone to Sunken Submarine

When the German submarine "U3" sank in the harbor at Kiel recently, with its crew of twenty-five men, communication with the trapped men was established by a buoy telephone over which the commander of the "U3" reported that the vessel had a forty-eight-hour supply of oxygen and that the crew were in no immediate danger.

For the three hours the men lay prisoners at the bottom of the bay they kept up a running fire of talk with their rescuers, and did all they could in a verbal way to aid in their rescue.

The accident demonstrated the value of the newly invented submarine telephone attachment with which all German torpedo boats are now equipped. This telephone arrangement is attached to the outside of the boat just forward of the tower. As soon as the "U3" sank it was detached by the officer inside of the disabled craft, and when the buoy reached the surface it was picked up by one of the other vessels that had been participating in the manoeuvres and connection made.

DEPARTMENT of RAILWAY TELEPHONES

The Lake Shore's Dispatching System

By Clifford Weldon

FROM Buffalo straight through to Chicago the Lake Shore and Michigan Southern Railway is making use of the telephone method of controlling train movements. This road has shown marked activity in the adoption of the new dispatching system during the past year. Its circuits now equipped consist in detail of the following:

Buffalo to Erie, 88 miles 21 telephone stations.

Erie to Cleveland, 95 miles, 25 stations.

Buffalo to Erie (message circuit), 88 miles, 21 stations.

Cleveland to Toledo, Sandusky division, 110 miles, 37 stations.

Cleveland to Toledo, Norfolk division, 116 miles, 35 stations.

Toledo to Elkhart, Indiana, Air Line division, 133 miles, 44 stations.

Toledo to Elkhart, Old Line division, 143 miles, 35 stations.

Elkhart to Chicago, 101 miles, 33 stations.

Ultimately there will be a branch for telephone dispatching from Elkhart to Grand Rapids, Michigan. This will be operated in conjunction with both the Air Line and Old Line dispatching circuits, using one in the daytime and the other at night.

The message and train dispatching telephone circuits of this road at present form one of the most complete and extended railway telephone equipments now in use. Since the railroads of the country began to take up the question of superseding the telegraph in the work which it had performed so well for fifty years, considerable progress has been made along the lines of improving dispatching circuits. The Lake Shore stands among the foremost railroads in this movement.

Dispatchers on the Lake Shore.

Western Electric telephones and selectors will be in use on over 2,000 miles of this road when improvements now under way are completed. A few details of the Lake Shore equipment are of the special design of Mr. Ryder, general superintendent of telegraph of the New York Central lines, and one of the pioneers in the active work of developing railway telephony.

The circuits on the Lake Shore have shown already a marked improvement over the old method of dispatching trains by telegraph. A telephone line has been equipped on the J. F. C. division from Youngstown to Oil City. It is somewhat unique in its construction and operation, consisting of three miles of No. 19 gauge cable, 100 miles of No. 9 B. & S. gauge copper and 85 miles of B. W. G. gauge iron wire. Notwithstanding the length of this line and the heterogeneous nature of its construction it is reported as operating successfully as far as both the transmission and the selective features are concerned.

It is rumored that this road will shortly be equipped throughout, for message work as well as train dispatching, with telephones.

The Lake Shore is particularly active in telephone installations.

Department of Railway Telephones

This department is established as a permanent feature of TELEPHONE ENGINEER. The progress of the art of telephone train dispatching, its technical developments, its news, and the elucidation of its mysteries for the non-technical worker will be found each month in these pages. The editors invite the problems and solicit the co-operation of the many readers of TELEPHONE ENGINEER in all parts of the world whose interests lie along these lines.

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Telephones on the Frisco

H. D. Teed, superintendent of telegraph for the Frisco, has the following interesting article in the *Frisco Man*, dealing with the use of telephones as against the telegraph in the dispatching of trains:

In the fall of 1906 the Frisco, like many of the other large systems, realized perhaps for the first time that its increasing business required more rapid means of communication than the telegraph afforded, and in common with the other progressive roads worked out comprehensive plans to make use of the telephone for the movement and control of its trains as well as for its message service.

Before the plans could be carried out, however, it necessitated practically the rehabilitation of the pole line in nearly all of the main line territory and entailed an enormous expense.

While this work was being done we find one of the most modern telephone exchanges has been installed at Springfield, with approximately 112 stations connecting with all departments as well as with the commercial lines of the Bell Telephone company at Springfield. A similar exchange has been installed at Kansas City, and with the one already in service at St. Louis, our heavier centers are well provided with a rapid means of communication locally.

In September last two heavy copper metallic circuits were completed between Springfield and Kansas City and each station provided with a telephone and signaling apparatus that enables the dispatcher to call or select any station desired without the knowledge of any other station. Similar service is rendered on the second circuit, designed for message service, and both of these circuits terminate in the private branch exchanges at Springfield and Kansas City.

When the dispatcher desires to call or select any particular station he merely turns one of the fifteen or twenty keys which are placed in a neat cabinet in front of him, and in eight seconds he hears the bell of that particular station ringing through the medium of a telephone receiver which he wears continuously, and in the instrument recognizes the voice of the regular operator at that station answering by pronouncing the name of the station and proceeds to put out the order or transact whatever business he has.

The dispatcher saves the labor of calling the station from five seconds to five minutes, as formerly, and is enabled to gather the collateral information so essential in the issuance of train orders, and, therefore, it gives him more time in which to formulate his plans for train movement. It has been proven that a dispatcher can handle approximately twice the volume of business with a telephone that could formerly be handled by means of the telegraph with less physical effort on the part of the dispatcher.

On the message circuit double the number of messages can be handled by two operators than with the telegraph. The speed of the sender on the Morse circuit is usually limited to the ability of the receiving operator to read and transcribe the Morse characters, and the average way operator's ability to do so varied greatly. With the telephone it has been found that the speed with which messages can be handled is remarkable and is limited only to the receiving operator's ability to write or copy on the typewriter, as it requires no skill to catch plainly spoken words. The message circuit between Springfield and Kansas City was originally cut at Fort Scott. The rapidity with which the business could be handled permitted this circuit to be cut through between these two points without delaying the handling of business normally and leaving room for five to ten-minute conversations between the subscribers on the private branch exchange at Springfield as well as those at Kansas City.

Superimposed upon these two metallic circuits is a third circuit, technically referred to as a phantom, over which the through business between Springfield and Kansas City is handled without interference with the conversations going on on the metallic or physical circuits. This latter circuit, while used to some extent by the commercial companies, was never attempted by any of the other railroads which have similar telephone facilities, for the reason that the best telephone engineers in the country had never undertaken to phantom circuits equipped with the special selector system of calling. The first experiment with the phantom proved so successful that it is being placed on all of the circuits as rapidly as they are completed. Today we have completed the two circuits between St. Louis and Springfield, between Springfield and Thayer, Springfield and Monett, and between Birmingham and Jasper, and it only remains for station apparatus to be installed to enable any station in St. Louis to talk with way stations or agents between St. Louis and Kansas City, Monett or Thayer, or vice versa, including any station on the private branch exchange at Springfield or Kansas City. The phantom circuits are designed to carry the through conversations in the same manner that the through Morse circuits carried the long distance messages, except that the long circuits can be instantly connected with the shorter circuits leading to a station.

The value of this ready means of communication is inestimable in case of a wreck on one of our passenger trains, which will be equipped with emergency telephone sets which can be instantly attached to the dispatcher's wire and the conductor can communicate with the dispatcher or any officer direct in half a minute from the scene of the wreck, where formerly he was obliged to walk to the nearest station and through the medium of a third person, the telegraph operator, report the accident. Likewise, it gives the wrecking boss a means of notifying the dispatchers of the progress of the work and the probable minute on which the line will be open.

Gill Selector Bulletin

The United States Electric Company has issued its bulletin No. 101 describing the Gill selectors for telegraph service. The bulletin, which is not a catalogue or price list, gives a sketch of the development of selective calling, particularly with regard to telegraph and railway uses. The selector is described and its operation explained. The illustrations include diagrams of circuits arranged for the selector to be operated in telegraph service in various ways as may be desired. The selector requires no extra battery and will work with the local battery usually employed. Furthermore, it will operate to call an office when the local battery is in so poor condition or the line in so bad adjustment that the sounder call is useless. The bulletin also describes the telegraph answer-back and the automatic calling keys, auxiliary apparatus designed to secure uniform calling and prompt answers. The equipment for selector outfits to operate under the various arrangements described is conveniently grouped and designated by code numbers.

A Study of Telegraphic Transmission

By Frank F. Fowle*

IV. LINE CONDUCTIVITY REQUIREMENTS.

EXPRESSIONS have been found for the relationship between line length, line resistance and line leakage in terms of the working currents to which the relays will respond in commercial service. The relay tests to determine these working currents have been described. It now remains to calculate the line lengths for various line resistances, with given line leakage and given relays.

Simplex Working.—Expression (45) gives the relationship between line length, line resistance and line leakage for simplex working, in terms of ϕ and α. The value of ϕ may be taken from figure 10 as .75 and the corresponding value of n is 4.00. This value of ϕ may not be attainable where the conditions are unfavorable, such as the operation of numerous circuits from a single gravity battery. But it should be obtained where the practice in this respect is proper, and it can be obtained readily where the current is supplied from a generator or storage battery source.

The value of α depends upon the values of line resistance K and terminal resistance r_e. The latter includes the relay, the battery if used, or the lamp resistance if generators or storage batteries are used, the terminal cable if any, the office wiring and the earth connections. The sum of all these resistances should be a minimum for corresponding minimum line cost, and too little attention is frequently paid to this matter.

For a 100-volt generator tap the lamp resistance will be about 200 to 250 ohms, and for a battery of 100 gravity cells, of 3 ohms internal resistance each, the total resistance will be 300 ohms. A relay of 150 ohms will bring the total up to 350 to 400 ohms with generator supply and 450 ohms for battery supply. A 35-ohm relay will bring the totals up to 235 to 285 ohms and 335 ohms, respectively. Terminal cable and office wiring should not increase these figures materially and the earth connection should have a very small resistance if properly constructed.

An average value of 300 ohms has been used for the terminal resistance in all cases. This value may be too low in some instances and too high in others, but it is believed to represent a fair attainable average.

The minimum insulation resistance has been assumed as .25 megohm for one mile of line, as experience indicates that this is a safe and conservative value to employ. Long lines under average conditions will seldom have their insulation reach a value as low as this, and that for only a few days in each year. Expression (45) may now be employed to calculate values of line length for various values of line resistance.

Resistance Per Mile.	Limiting Line Length.	Resistance Per Mile.	Limiting Line Length.
2 ohms	597 miles	15 ohms	248 miles
3 ohms	510 miles	20 ohms	217 miles
4 ohms	450 miles	25 ohms	195 miles
6 ohms	376 miles	30 ohms	179 miles
8 ohms	331 miles	40 ohms	156 miles
10 ohms	299 miles	50 ohms	140 miles

*A report on the use of copper, iron and copper-clad steel wires in telegraph service, made to Frank R. Chambers, Jr., vice-president of the Duplex Metals Company, August 1, 1910. Continued from the January number of TELEPHONE ENGINEER.

Way or local circuits may be calculated upon the assumption that the resistance of the relays at the intermediate offices is uniformly distributed through the line wire. If the offices are uniformly distributed over the line this assumption is approximately correct. An examination of railroad time-tables to find the average mileage interval between towns and stations shows that they are distributed with very fair uniformity.

Relays of 35. ohms resistance are now the best practise for way circuits. If these are distributed every ten miles and every five miles, the effect will be as follows:

	LIMITING LINE LENGTHS.		
Line Resistance Per Mile.	Through Circuits.	Stations Every 10 Miles.	Stations Every 5 Miles.
2 ohms	597	391	313 miles
3 ohms	510	363	299 miles
4 ohms	450	341	286 miles
6 ohms	376	305	265 miles
8 ohms	331	280	248 miles
10 ohms	299	260	234 miles
15 ohms	248	225	208 miles
20 ohms	217	201	188 miles
25 ohms	195	183	174 miles
30 ohms	179	170	162 miles
40 ohms	156	150	144 miles
50 ohms	140	...	.....

The result of using other values of ϕ and n than the ones assumed, may be calculated from (45). The following table has been prepared in order to show this, taking a line of 10 ohms resistance per mile and the values of ϕ given last month:

Value of ϕ.	Value of n.	Limiting Line Length.
.80	5.00	335 miles
.75	4.00	299 miles
.70	3.33	269 miles
.65	2.96	249 miles
.60	2.50	221 miles
.50	2.00	181 miles

This table shows that the line length increases as the working margin in the relays decreases, and hence it is important to avoid any conditions which impair the margin. For example, two lines should never be supplied from the same lamp resistance when generators or storage batteries are used as a source of current supply. When gravity battery is used, the best results will be obtained when only one line is supplied from one battery. Assuming an E.M.F. of 1.08 volts per cell, an internal resistance of 3. ohms and a line current of .050 ampere, one wire will reduce the terminal voltage 14 per cent and two wires will reduce it 28 per cent. If the battery furnishes a current of .050 ampere to a single wire, the addition of a second wire will reduce the current in the first wire 16 per cent, or from .050 to .042 ampere. A relay adjustment in the first wire to operate on .050 and release on .037 ampere would result in interference from signals on the second wire; the necessary ratio of releasing to operating current in the first wire, in order to avoid this interference, would materially reduce the limiting line length, or to maintain the former line length, would considerably increase the line cost.

It was stated before that the line cost is sub-

stantially proportional to the leakage conductance. The exact result of assuming other values of leakage than the one used, with a wire of 10. ohms per mile, has been calculated and the results are given below:

Insulation Resistance Per Mile in Ohms.	Leakage Conductance Per Mile in Mhos.	Limiting Line Length in Miles.
1,000,000	$1x10^{-6}$	624
500,000	$2x10^{-6}$	433
250,000	$4x10^{-6}$	299
125,000	$8x10^{-6}$	204

This table shows that the limiting line length increases rapidly as the leakage diminishes, and emphasizes the importance of obtaining the highest possible insulation. If the insulation could be increased indefinitely, the limit on the line length would be fixed by the maximum permissible voltage.

Assuming this to be about 400 volts at each terminal, the total resistance corresponding to a current of .050 ampere would be 16,000 ohms. The line

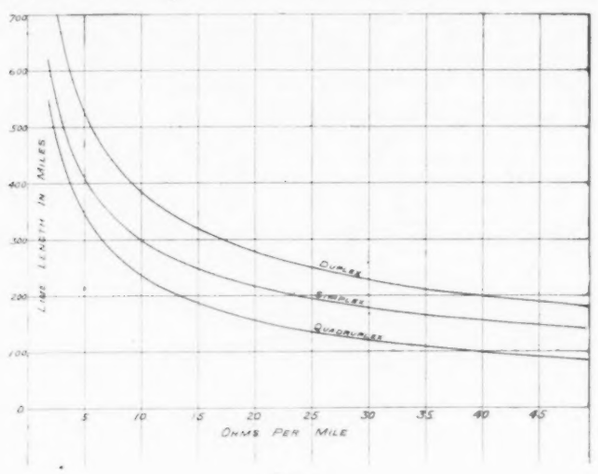


Fig. 5.

length would be inversely proportional to the line resistance, assuming that a commercial speed of working could be obtained. The last consideration would, in such a case, be the controlling one.

Duplex Working.—Expression (45) may be used again, provided that n has the values given in (71) and (72). It has been assumed that polar relays of 800 ohms resistance will be used. The value of §, assuming a maximum line current of .030 ampere, and .004 ampere necessary for reversals, is found from (66) to be .73 and a value of .75 has been used. The average lamp resistance has been taken as 300 ohms. The results of the calculations appear below:

Resistance Per Mile.	Limiting Line Length.	Resistance Per Mile.	Limiting Line Length.
2 ohms	783 miles	15 ohms	318 miles
3 ohms	658 miles	20 ohms	278 miles
4 ohms	580 miles	25 ohms	250 miles
6 ohms	485 miles	30 ohms	229 miles
8 ohms	425 miles	40 ohms	200 miles
10 ohms	384 miles	50 ohms	180 miles

This table shows considerably greater line lengths for the same line resistance than are obtainable with simplex working, as given in the table under that division. That is, duplex working has considerable margin over simplex working under the same conditions. This conclusion is verified by experience.

Quadruplex Working.—The neutral side of a quadruplex has much less margin than the polar side, and is the first to fail as the line insulation falls from high to low values. Consequently the polar relay need not have as high a resistance, and corresponding turns, as the neutral relay. It has been assumed for the purposes of calculation that the polar relay will have 400 ohms and the neutral relay 800 ohms, total resistance.

The current supply for quadruplex circuits is commonly obtained from generators, although batteries are sometimes used. The Field key system is frequently used to obtain the low or short-end voltage, when a generator supplies the high or long-end voltage. The standard lamp resistance is 600 ohms, and this value has been assumed in the calculations.

The minimum value of operating current in the 800-ohm neutral relay has been taken as .030 ampere, which the tests of neutral relays show is attainable. The low or short-end value of E.M.F. has been assumed as 90. volts and the ratio of the high voltage to the low has been taken as 3.5 to 1. A ratio of 3. to 1. is much used, and sometimes 4. to 1. Inserting these values in formulae (53), (55), (73), (93), (94) and (96), the results are:

Resistance Per Mile.	Limiting Line Length.	Resistance Per Mile.	Limiting Line Length.
2 ohms	531 miles	15 ohms	186 miles
3 ohms	442 miles	20 ohms	156 miles
4 ohms	386 miles	25 ohms	135 miles
6 ohms	313 miles	30 ohms	120 miles
8 ohms	268 miles	40 ohms	98.7 miles
10 ohms	236 miles	50 ohms	84.3 miles

This table shows that the line lengths for quadruplex working are less than for duplex or simplex working. The maximum line length is obtained with the maximum value of high or long-end E.M.F., minimum value of relay operating current and minimum terminal resistance.

During the course of this investigation, careful calculations were made to determine the operating currents under limiting conditions on an actual quadruplex circuit. The line was 500. miles long, of No. 9 B. & S. gauge copper, with about 8. miles of cable. The E.M.F.'s were 290. and 85. at one end and 255. and 80. at the other, giving ratios of 3.4 and 3.2 or an average of 3.3. The polar relays were wound to 180. ohms and the neutral relays to 300. ohms, one of the latter being the Foote-Pierson relay before described and tested. The Field key system was employed, but the lamp resistance in the generator tap was only 200. ohms, instead of the usual 600.

The normal balance in the artificial line during clear weather was 2,900 ohms, from which it was determined that the average line resistance was 5.1 ohms per mile, assuming no appreciable leakage. The neutral side failed when the balance fell below 1,800 ohms; from this minimum operative value it was calculated that the corresponding insulation resistance per mile was .78 megohm, and that the equivalent magnetizing current in one of the neutral relay half-windings, to operate it, was .054 ampere.

This calculated value of operating current checks closely the estimated value deduced from the tests, which was .050 ampere. The insulation resistance at which the neutral side failed is about three times the standard value assumed in this investigation. The neutral side was stated to fail several times a year, but not frequently, which confirms the statement that .25 megohm per mile is a safe conservative value to

employ in computing the necessary resistance of line conductors for continuous service.

The lamp resistance used, 200 ohms instead of the usual 600, had been found to give better working than the latter. This fact confirms another deduction from theory, namely, that the maximum margin of working, or the maximum line length, requires a minimum terminal resistance.

Summary.—For the purpose of comparison, the line lengths given in these tables have been assembled in the following:

Resistance Per Mile in Ohms	Limiting Line Length in Miles. Duplex.	Simplex.	Quadruplex.
2	783	597	531
3	658	510	442
4	580	450	386
6	485	376	313
8	425	331	268
10	384	299	236
15	318	248	186
20	278	217	156
25	250	195	135
30	229	179	120
40	200	156	98.7
50	180	140	84.3

This table has been used in preparing a set of curves shown in Fig. 5, which will be used to interpolate the mileages for wires whose resistances do not coincide with the tabular values above.

(To be continued.)

Pennsylvania Installs Telephones in Philadelphia

The Pennsylvania Railroad is installing a telephone system of controlling train movements at its Philadelphia terminal. This is believed to be the first installation of a complete telephone dispatching system within the limits of a terminal.

This system is unique, being in some measure a telephone train wire having intercommunicating features only between certain points. Dispatchers' offices are located at "S" tower, which is a telegraph office at Thirty-second street, and at "A" tower, at Seventeenth street. At the latter point three calling equipments are provided, which enables any one of the three operators to call any station, while at "S" but one calling equipment is provided.

The various way stations, of which there are fifteen, can call automatically either "S" or "A," but there is no provision for calling the other way stations. Accordingly both dispatchers' offices are equipped with selectors, as are the regular way stations.

Under ordinary operating conditions the dispatchers at "A" will call the various way stations, but in cases of emergency the "A" tower will be cut out and the train movements controlled from "S." The complete equipment of telephone and selector apparatus was supplied by the Western Electric Company.

New Equipment on the C., I. & S.

Trains are now being operated on the Chicago, Indiana & Southern Railroad by telephone, the work of equipping the road for dispatching trains by this means, having been completed. The equipping of the road with telephone is another step in the equipment in this manner of all the lines of the New York Central system.

The dispatching of trains by telephone has been tried out by many of the leading railroad systems of the country and has proved practical and of value, resulting in its permanent retention.

Every station on the C., I. & S. has been provided with a telephone and wires were strung on the telegraph poles. The telephones will be used only for dispatching trains, all other railroad business being done over the telegraph wires.

Trains will be operated as formerly from the dispatcher's office in Kankakee, Ill., from South Bend, Ind., at the east end of the line to Zearing, Ill., the western terminus. There are nearly fifty stations on the line, all of which have been equipped with a telephone. The telephones are of a particular make, especially fitted for railroad work. It is possible for the dispatcher to call any operator on the line without disturbing other operators.

The work of equipping the line has been going forward for the past four months. The Danville division of the road, operating from Chicago to Danville, Ill., was first equipped and the local division followed. A large per cent of the lines of the New York Central system employ the telephone in the dispatching of trains, including the Lake Shore and Michigan Southern.

Telephones on the Evansville & Terre Haute

The Evansville & Terre Haute railway has recently equipped its main line from Evansville to Terre Haute, Ind., with a telephone train dispatching circuit consisting of 27 regular way stations, 25 siding telephones and 25 block telephone stations. The siding telephones have been placed on the block wire. The line has numerous sidings branching out to mines, as well as a great deal of the local work is handled by the block number of bling sidings, and traffic is so heavy that a system.

A system of repeating coils and switches has been installed. It is possible by means of this to connect a branch telephone direct to the train wire in case it is found necessary for a train crew to talk to the dispatcher.

Another interesting feature of this installation is that the block telephone wires are simplexed for telegraph work, thus providing a local telegraph station for message work at each block office. In some cases the local telegraph stations are installed in offices not arranged for block service. To accomplish this a special circuit was furnished by the Western Electric Company, which installed the telephone equipment. By the introduction of this simplex arrangement for local message work, it is claimed the officials were able to save on the installation approximately $2,000.

Telephones on Trolley Cars

In the effort to reduce the running time by trolley between Philadelphia and Allentown, Edwin C. Spring, traffic manager of the Lehigh Valley Transit Company, has made a thorough survey of the division and arranged for a series of improvements.

Bids have been invited for the most improved and up-to-date steam road block signal system, similar to the block signal systems in use on steam roads. Operations will be conducted by telephone, an instrument to be carried on each car that can be attached to brackets on poles about every half-mile apart. During

rush hours, especially every evening and all of Saturdays and Sundays, there will be extra cars.

Twenty minutes in running time will be saved when the new Lehigh Mountain cut-off is utilized.

Activity in British Columbia

Material orders meaning an expenditure of over $500,000 and calling for half the output of the Wire & Cable Company, of Montreal, for the next six months, as well as a large proportion of that of the Northern Electric Company of the same city, have just been sent east by the British Columbia Telephone Company, according to the *Canadian Electrical News*.

Not only do these huge orders mean the expenditure of a vast amount of money, but they also mark the culmination of seven months spent by the telephone employes in plotting out every house and lot in the Greater Vancouver peninsula which might mean a telephone possibility. In order that the preparations of the company for increased plant and equipment might prove to be adequate to the needs of the district it was designed that a complete plan should be prepared of every lot and building in this section of the country where telephones would some time in the near future be required. Such a plan as this naturally meant a great amount of labor. Not only were the buildings now occupied and those under construction taken into consideration, but even the empty lots where it was thought that houses would soon make their appearance if the district's rate of growth continued were added in the scheme. This involved over half-a-year's work and meant that while it was going on comparatively little could be done in the way of securing cable and other wire supplies for the reason that it might be found on the completion of the development study that the cables or other facilities would not fit in with the other portions of the system.

The plotting labor was finished just a short time ago and since then the orders have been simply pouring into the offices of the two Montreal firms from the British Columbia Telephone Company. Over 250,000 feet of cable are required for the purposes of the telephone company, averaging in size 200 pairs of wires per cable. Some of the cables, however, will go as high in capacity as 600 pairs of wires. The total capacity of the cables ordered is 100,000,000 feet of copper telephone wire.

In addition to these large orders 25 tons of supporting wire for the cables is on the way from Montreal, while 60 tons has already arrived from England and a similar shipment is still to come. It was found necessary to go to the old country for a portion of the supporting wire as the Montreal firm was not able to handle the whole order in connection with the cables and the other wire.

In connection with the new offices being erected at Kitsalano, Mount Pleasant and Grandview, the Northern Electric Company is subletting contracts for three heavy duty White & Middleton gas engines for emergency use in case the regular power goes off. The ordinary power will be supplied to the branch exchanges by three 24-volt generators to which will be attached thirty 40 horsepower induction motors.

The material now on order for the telephone company is arriving at the rate of a carload one day in each week and in order to properly handle the supplies at this end a private railway yard has been established on Dunlevy street in close proximity to the C. P. R. line, where the material will be received and stored.

The material value of the orders mentioned above is given out as something over $350,000. When the freight, installation, labor and cost of the branch exchange construction is taken into account it is expected that the total outlay necessitated by the improvements contemplated will be well over the half-million mark.

Good progress is being made on the erection of the branch exchange. In addition to these buildings the local business of the company will be further handled in a new portion added to the present Seymour street main office. There, a three-story brick addition has just been completed. The first two floors are to be devoted to plant department offices, while the top story will be occupied by the long distance toll switchboard, which is to be moved out of the general switchboard room to provide space for the new local switchboards to be installed.

The British Columbia Telephone Company will next spring lay a second submarine cable between Victoria and Vancouver. The new cable will be similar to the one laid between France and England, known as the Pupin coil cable, having special fittings for taking up the aquatic electrical currents.

Lehigh Valley Extending Telephone System

The success of the telephone train dispatching circuits recently installed on the Lehigh Valley railroad has led to further extensions of this new method of handling train movements. A telephone line has just been cut into service between Packerton and Bernice, Pa., the dispatcher being located at Wilkes-Barre. The telegraph will soon be supplanted also between Wilker-Barre and Sayre, adding about 90 miles more.

The new circuit just placed in operation is known as the eastern end of the Wyoming division. It connects with about twenty-five way stations, and is approximately 140 miles long. This train wire is divided into three sections, each radiating from Wilkes-Barre. The signaling equipment is so arranged that when a dispatcher calls any station signaling impulses are sent out over that particular section only. One section, which is known as the Mountain Cut-Off, has a special arrangement whereby in the event of any trouble on the train wire it is possible to connect it into the main line, thus fitting the circuit on either side of the trouble and enabling the dispatcher still to get every station.

A complete equipment of telephone and selector apparatus for this new circuit has been furnished by the Western Electric Company. The Lehigh Valley plans eventually to use the telephone exclusively for the important work of dispatching trains.

B. & O. Has New Telephone System

The Baltimore & Ohio railroad has just installed a telephone train dispatching equipment, made by the United States Electric Company, between Grafton, W. Va., and Salem. The circuit is 35.8 miles long and there are twelve stations on the line, the dispatcher being located at Grafton. The Gill selector is installed at each of these stations and the signal bell is rung by the main line current, the source of power being at the dispatcher's office. This circuit covers a busy section of single track road and telephone dispatching is expected to expedite train movement over the division.

Of Interest to the Trade

Chicago's Sixth Electrical Show

The sixth annual show of the Chicago Electrical Trades Exposition Company opened January 7, at the Coliseum with all available space occupied.

The decorative scheme was a cloud-flecked sky, illuminated by indirect lighting units to get a realistic effect.

The United States government exhibit occupied the entire Coliseum annex. In this exhibit models of war vessels, photographs of the governmental projects, samples of armamament, etc., were shown. The government also showed a wireless telegraph station as used in the navy, and messages were exchanged with neighboring stations.

In the center of the Coliseum was a tall column of wire coils. Each visitor was invited to estimate the number of feet of wire in the column. Prizes offered included a Woods electric automobile, Tel-Electric piano-player, Thor electric washing machine, Cutler Hammer water heater, portable lamp, Westinghouse fan, Cadillac electric stove and toaster, and Simplex toaster.

General View of the Chicago Electric Show.

Among the exhibits were:

Addressograph Company, exhibiting electrically-operated machines for addressing envelopes, cards, etc.

Allis-Chalmers Company, a full line of electrical products, such as transformers, alternating and direct-current motors, air compressors, etc.

American Ozone Company, machines for sterilizing water. E. C. Spurg and S. F. Butler in attendance.

American School of Correspondence, electrical and other textbooks. Sample pages were shown from a forthcoming cyclopedia of telephone and telegraph by K. B. Miller and S. G. McMeen.

American Steel & Wire Company, samples of magnet wire, rubber-covered wire, trolley wire, telephone wire, lamp cord, lead-enclosed cables, paper-covered cables, rail bonds, etc., including a span of telegraph wire between two standard poles located at each end of the booth and equipped as in actual service. B. H. Ryder was in charge.

American Telegraph Typewriter Company, telegraph typewriter, which sends messages over telegraph or telephone wires and prints them at both stations. Lines of the Chicago Telephone Company were used in demonstrating.

American Telephone & Telegraph Company operated a long distance pay station at the exposition during the day, in the evening demonstrating its long distance service to the larger cities. Maurice J. Kenyon in charge.

Anderson Carriage Company, electric automobiles.

Apex Appliance Company, washing machines.

Armstrong Company, G. W., "Acco" electrical novelties, the Acco lamp hanger and Excello flaming arc lamps.

Automatic Enunciator Company, loud-speaking tele-

phones designed for railway stations, hotels, etc. Represented by Louis Cole, Percy Hinkley and F. B. Ijams.

Babcock Electric Carriage Company, electric vehicles.

Britman Electric Company, suction cleaners, vibrators, hair dryers, beauty lamps.

Cadillac Eelectric Manufacturing Company, electric heating and cooking devices, toasters, percolaters, corn poppers, griddles, stoves, etc.

Chicago Fuse Manufacturing Company, sample boards of conduit outlet boxes, sectional switch boxes, inclosed fuses, blocks, fuse wire and links.

Chicago Pneumatic Tool Company, electric drills, grinders, hoists, pneumatic tools.

Chicago Telephone Company, telephone exchange apparatus in actual operation, large multiple switchboard in two sections, employing six operators, with supervisors, chief operator, etc., mounted on a slowly revolving platform. Represented by A. M. Ramsay, contract agent; N. Anderson, traffic chief, and O. W. Stitt.

Commonwealth Edison Company, an electric lighted street and six stores lighted by different methods and containing examples of applied electricity.

Cosmopolitan Electric Company, motor-diven automatic lathe in operation turning out brass souvenirs; motor-driven air compressors, forge blowers, lifting magnet, lifting pig iron, etc. Represented by Homer E. Niesz and J. H. Delany.

Crane Company, cast-steel motor-operated gate valves, emergency valves with electric release, steam traps, pipe joints and small valves.

Cutler-Hammer Manufacturing Company, electric irons, stoves, curling iron heaters, radiators, chafing dishes, coffee percolators, teakettles, disc stoves, carbon instantaneous water heaters.

Duntley Manufacturing Company, electrically-operated vacuum cleaners, air washers, air purifiers, manually operated cleaners, etc.

Driver-Harris Wire Company, resistance alloys, "Nichrome" wire, "Climax," a nickel steel alloy; "Advance," a copper nickel alloy, and "Monel" metal.

Domestic Equipment Company, washing machines.

J. R. Deane & Company, Peerless interpole motors, Colonial oscillating fans, motor starters and speed regulators.

Edison Storage Battery Company, various types of cells manufactured by the company, assembled for electric vehicle propulsion, lighting of railway cars, house lighting batteries and ignition sets.

Electric Testing Laboratories, methods of testing paper, devices for tensile strength, bursting strength, thickness and folding endurance of paper.

Electric Storage Battery Company, various types of storage battery, including "Chloride Accumulator," "Exide" and "Tudor" types, apparatus for farm lighting plants and batteries for railway car lighting and signal work. Represented by Godfrey H. Atkin, T. Milton, R. I. Baird, T. A. Cressey, P. G. Downton, J. N. Rosholt and H. M. Beck.

Empire Vacuum Company, portable cleaners and accessories.

Everson, C. G. & Company, novelty portable electric lamps, water filters and coolers.

Excello Arc Lamp Company, flaming arc lamps, and the new long-burning axis-type flaming arc lamp just perfected, which is claimed to burn seventy hours on one trim. Also a new globe for flaming arc lamps, said to increase the life from seventeen to forty hours. George W. Armstrong and H. Caird in attendance.

Farmington Automobile Company, electric pleasure vehicles.

Federal Electric Company, electric signs, tungsten flasher signs, "Adlite" window lighting devices, vacuum cleaners, tungsten fixtures and clusters, portable lamps, Willis meters, "automatic" kitchen cabinets.

Flexlume Sign Company, signs in raised prismatic letters.

Fort Wayne Electric Works, motor driven rock drills, small motors, eight inch fan motors, a regulator, transformer and switchboard for incandescent and tungsten series operation, meters, bell ringing transformers, toy transformers and supplies.

General Electric Company, electric lamps, arc and incandescent, rheostats, controllers, small motors, fan motors.

Hoskins Manufacturing Company, electric furnaces, including wire-wound resistance type, carbon-resistance type and small crucible furnaces, electric hot plates of different forms, electric pyrometers, soldering irons and toasters.

Hughes Electric Heating Company, electric ranges and stoves.

Hurley Machine Company, Thor electric laundry machines, enamel machines.

Hamler-Eddy Smoke Record Company, automatic smoke records.

Houston Manufacturing Company, vacuum cleaners.

Illinois Appliance Company, lamp changers, the Bendyke vibrator and the Waage line of electric soldering tools.

International Correspondence Schools, lesson papers and drawings.

Jenette Manufacturing Company, electric air compressors for saloon and garage purposes.

Judd Laundry Machine Company, electric washing machines.

Kratz, A. W., electric washing and wringing machines.

Keller Manufactruing Company, electric vacuum cleaners.

Kimble Electric Company, variable-speed, single-phase motors, constant speed and variable speed with conphas motors, constant speed and variable speed with controllers.

Kinetic Engineering Company, electric organ blowers.

Macbeth-Evans Glass Company, reflectors, art glass shades, portable lamps.

Machado & Roller, portable and switchboard volt, ampere and wattmeters for direct and alternating current, ohmmeters, testing sets, fault spotters and circuit-breakers.

Manhattan Electric Supply Company, electric heating and cooking utensils, dry batteries, experimental wireless telegraph outfits, telegraph instruments, electric auto horns, medical apparatus, etc.

Mail-O-Meter Company, machines which stamp and seal letters and register the number of stamps used.

McCrum-Howell Company, vacuum cleaning machines.

Millar Electric Company, electric heating specialties.

Minerallac Electric Company, printing attachments for meters, quick-action voltmeter switches, electroscopes.

portable sable-testing sets, cable hangers, phase-rotation indicators and minerallac. C. I. Hall, H. S. Simes and C. C. Lovejoy in attendance.

National Carbon Company, Columbia multiple batteries, dry cells, novelty batteries, lighting carbons for flaming arcs, carbon brushes.

National Electric Lamp Association, Mazda train-lighting lamps, different sizes of Mazda-Holophane units with satin-finish reflectors, display rack showing different types and sizes of Mazda miniatures, 500-watt Mazda lamps with reflector sockets, multiple clusters using Mazda lamps and metal porcelain finish reflectors, 110 and 220-volt Mazdas.

Henry Newgard & Company, boards, steel cutout cabinets and electrical specialties.

Nuway Service & Sales Company, vacuum cleaners.

Pelouzez Electric Heater Company, toaster-stove and griddle, copper-top disc stoves, irons, coffee percolators, chafing dishes, water cups, tea kettles, etc.

Philadelphia Storage Battery Company, vehicle batteries and parts, sparking batteries and parts and auto-lighting batteries and parts.

Ralph Temple Automobile Company, Baker electric vehicles.

Rider-Ericsson Engine Company, electric house pump, turbine pump and triplex pump.

Rosenfield Manufacturing Company, vacuum cleaners.

Sefton Manufacturing Company, corrugated paper, corrugated fiber board boxes for express and freight shipments, corrugated fiber board boxes for shipping electrical goods, telephones and accessories, and special folding boxes to hold transmitters, telephone receivers, etc. R. E. Ferguson and W. H. Fairchild in charge.

Simplex Electric Heating Company, oven for hotel, bakery or restaurant use, toasters, irons, heating pads, etc.

Stolz Electrophone Company, the electrophone, a telephonic device for the deaf.

Studebaker Automobile Company, electric truck, delivery wagon, a Victoria and a coupe.

Subway Telephone Construction Company, complete automatic telephone exchange, manufactured by the Automatic Electric Company. Represented by Fred S. Williams, J. C. Lang, W. N. Curtis and William Stroud.

Swedish-American Telephone Company, magneto apparatus, combined electric clock and telephone, radio desk telephone holder and new unit-type switchboard. E. B. Overshiner, A. V. Overshiner, Fred Seeley and W. O. Rhode in charge.

Tel-Electric Company, the Tel-Electric piano player.

Thordarson Electric Manufacturing Company, ignition coils, bell-ringing transformers, sign-lighting transformers, toy transformers, laboratory and experimental apparatus, electric fireless cookers. A. R. Johnson in charge.

Toledo Electric Welder Company electric welding machines.

Union Light & Supply Company, "Just" imported tungsten lamps, 16 to 1,000 candlepower, Delco heating devices, chafiing dishes, percolators, electric soldering irons, glue pots, flatirons, electropads, vulcanizers and stoves, Acme heaters and electric carbons.

Vulcan Electric Heating Company, electric soldering, branding and capping tools, curling irons and accessories.

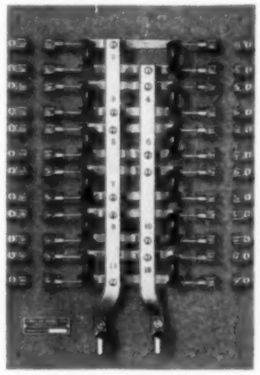
Westinghouse Electric & Manufacturing Company, Westinghouse Lamp Company and Cooper-Hewitt Electric Company, adjustable-speed alternating current motors, cooking and heating devices, meters, transformers, rectifiers, fans, "wire type" tungsten lamps.

New Crouse-Hinds Panels

Under the title of type "A" panels, the Crouse-Hinds Company presents an extensive line of new panel boards arranged for N. E. C. enclosed fuses and with or without knife switches in branches. In all, 896 panel boards are regularly listed in this classification, and each of them can be variously altered in details of arrangement to suit special requirements.

These panels are made for two-to-two and three-to-two wire, 125 and 250-volt systems. Four separate arrangements of mains are provided; namely, with lugs only, fused, with fuseless knife switch and with fused knife switch. Branches accommodate 3 to 30-ampere N. E. C. enclosed fuses, and, where switches are used, are located between the switches and the outgoing circuits. Thus, when a switch is open, both switch and fuse are dead, and fuses can be changed without danger of shock. These switches, naturally, are also of 30-ampere capacity.

While the styles and variations of styles of type "A" panels are numerous, a singleness of quality marks them all, only the best material for each particular purpose being used. The base is of oiled, black Monson slate, free from flaws or metallic veins, and all current carrying parts are of the highest grade hard drawn copper of 98 per cent conductivity, as based upon a maximum current density of 1,000 amperes per square inch cross section. The fact that all exposed copper parts, other than contact surfaces, are polished and lacquered adds much to the already handsome appearance of these panels.



Crouse-Hinds Panel.

Two to two-wire panel boards are connected in the regular manner, adjacent poles of adjoining circuits being of the same polarity, but fed by separate bars. Three to two-wire panels are conected for the Edison three-wire system; that is, each branch circuit has one pole connected to the neutral busbar and the other pole connected to one of the two outside busbars. As with the two to two-wire panels, however, they are connected so that adjacent poles of adjoining circuits are of the same polarity, though fed by separate bars.

Branch and main bars are formed up. This does away with connecting pillars between mains and branches and also at ends of mains. Consequently, the number of separate contacts is materially reduced. Knife switches, both in regard to contacts and standards, are formed from ½-inch by No. 16 gauge copper, and blades from ½-inch by No. 13 gauge copper. In order to make absolutely perfect electrical connection, the blades are ground in contact, and they are also moulded into handles of superior composition, which reduces to a minimum the danger of the latter breaking or splitting.

Contact clips are provided with flared tops, so as

to insure the proper entrance for the blades. Another feature is the spring washer that is placed on each hinge joint. This washer holds the joint under compression and thereby keeps contact positive at all times.

Main switches regularly are mounted at the bottom of the panel board, but if the purchaser desires it, will be located at the top. Among other options offered are black enameled slate, white Italian or blue Vermont marble bases; open link fuses; fuses between branch switches and main bars; branch circuit strips and switch bases made of ½-inch by 5/32-inch copper, and switches made with contact and standard clips driven and sweated into the base blocks.

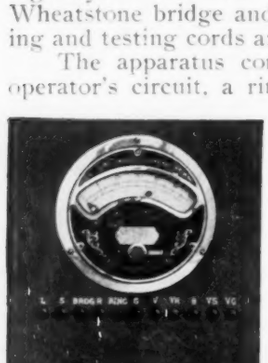
Everything considered, this line of type "A" panel boards is one of the most complete ever offered to the trade. They are fully described and illustrated in a handsome two-color, 80-page catalogue just issued by the Crouse-Hinds Company. This catalogue also lists, with equal detail, numerous other types of panel boards, all containing individual qualities of merit, as well as an extensive offering of boxes and trims.

Testing Cabinet for Small Switchboards

To meet the demand for an inexpensive testing outfit for small telephone exchanges, where a reliable means of testing is absolutely essential, but where the outlay for an elaborate wire chief's equipment seems prohibitive, the Western Electric Company has placed on the market a new testing cabinet.

This cabinet, known as the No. 1407, can be used with any switchboard and will do practically the same work as the large and expensive wire chief's desks. It is made in two styles, one for use with magneto switchboards and the other with common battery switchboards. The cabinet is adapted to be fastened to the end of a regular switchboard, or elsewhere, as desired. The volt meter is mounted on the front of a substantially made oak case, directly above the switching keys. The two terminals for connection to a Wheatstone bridge and the terminals for the grounding and testing cords are arranged at the bottom.

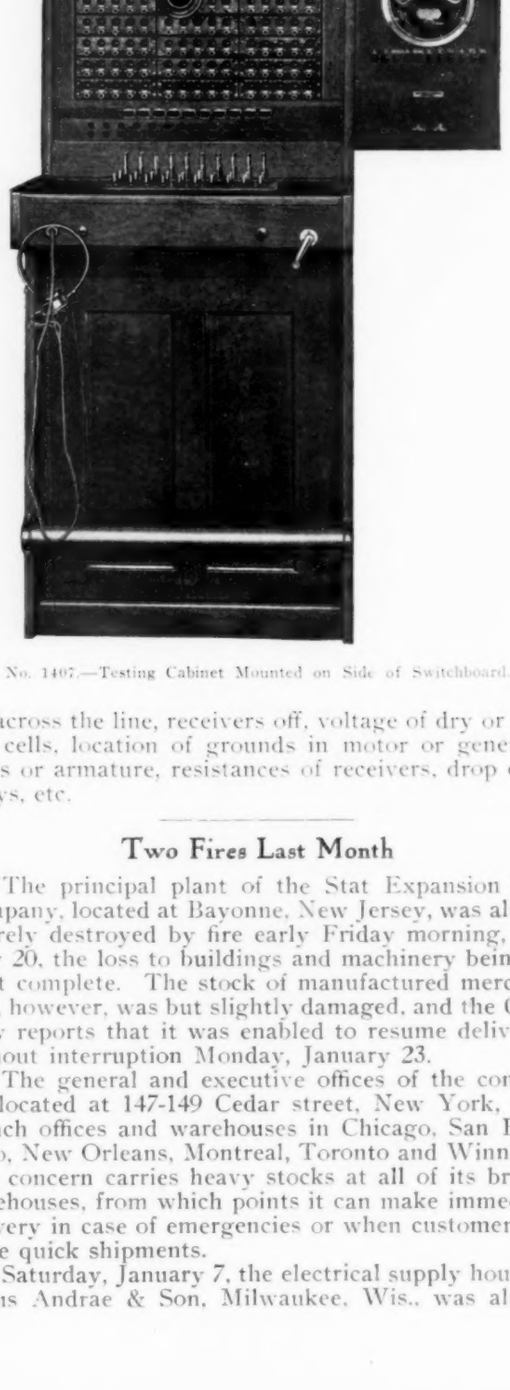
The apparatus consists of a testing circuit, an operator's circuit, a ringing circuit with keys and a grounding cord with flexible cord and plug. Both the testing circuit and grounding cord terminate on eight foot cords, and are equipped with No. 47 cord plugs. With these cords it is possible to reach across and get connection with the lines which terminate in the adjacent switchboard.



No. 1407.—Testing Cabinet.

A pair of binding posts placed in the rear of the cabinet provide a convenient means of connecting the telephone lines at the main distributing frame or terminal board, directly with the testing cabinet apparatus. By running a pair of wires from these binding posts to some convenient place near the main distributing frame and using a flexible cord provided with a test plug fitting the protectors, it is possible to test either the switchboard circuit or the outside line.

Some of the tests which can be made with this testing cabinet are grounds, opens, shorts and partial shorts, crosses, foreign battery, insulation, leaks, cross talk, loose connections, swinging troubles, earth potentials, poor grounds, open fuses, low resistance ringers across the line, receivers off, voltage of dry or storage cells, location of grounds in motor or generator fields or armature, resistances of receivers, drop coils, relays, etc.



No. 1407.—Testing Cabinet Mounted on Side of Switchboard.

Two Fires Last Month

The principal plant of the Stat Expansion Bolt Company, located at Bayonne, New Jersey, was almost entirely destroyed by fire early Friday morning, January 20, the loss to buildings and machinery being almost complete. The stock of manufactured merchandise, however, was but slightly damaged, and the Company reports that it was enabled to resume deliveries without interruption Monday, January 23.

The general and executive offices of the concern are located at 147-149 Cedar street, New York, with branch offices and warehouses in Chicago, San Francisco, New Orleans, Montreal, Toronto and Winnipeg. The concern carries heavy stocks at all of its branch warehouses, from which points it can make immediate delivery in case of emergencies or when customers require quick shipments.

Saturday, January 7, the electrical supply house of Julius Andrae & Son, Milwaukee, Wis., was almost

totally destroyed by fire. The stock lost is said to be valued at $200,000, while the building could not be duplicated for less than $35,000. Work has been commenced on new quarters and meanwhile the company is filling orders as usual.

A New Harmonic Ringer

The Western Electric Company has recently placed on the market a new harmonic ringer, which

No. 41.—Type Ringer, 50 Cycle.

has proven from actual service that it will satisfactorily meet the most exacting conditions.

This ringer, known as the No. 41 type, operates on the same potential of 140 volts for all four frequencies. This simplifies the harmonic ringing system and eliminates the use of the higher voltages, which have been

No. 41.—Type Ringer, 33 Cycle.

objectionable in low voltage telephone circuits and apparatus.

The construction of this ringer is such that no armature adjustment is required after it leaves the factory. The adjustment of the gongs can be quickly, easily and accurately made by means of an eccentric screw. After the adjustment is once made the gongs can be rigidly and permanently set by tightening the screws which lie directly behind the adjusting screw. The very simplicity of the adjustment of this ringer is a unique feature, as the only tool required is an ordinary screwdriver, which every repair-man carries in his pocket.

The coils of this ringer are wound with black enameled wire, which makes them practically impervious to moisture and of high efficiency.

Every detail in this ringer has been especially designed for strength, durability and ease of adjustment with a view of practically eliminating the factor of ringer maintenance in harmonic systems.

Black Enamel Wire

The demands of the larger manufacturers of electrical apparatus, particularly apparatus of the types in which small magnetic coils are used, for an insulated wire which would enable them to increase the efficiency of their product while decreasing its cost, have led to the development of a black enameled insulation for magnet wire. Efforts in this direction have been rewarded with even greater success than had been hoped for.

Prior to the development of black enameled magnet wire attempts had been made to produce a satisfactory substitute for silk insulation. These were not successful, as the product either did not possess many of the essential features of satisfactory insulation, or it was not such that it could be manufactured commercially. Black enameled wire is now offered to the market by the Western Electric Company and has been tested under the severest conditions. This wire is no longer an experiment or a theory, but a commercial success. It is being used extensively by many of the large manufacturers of electrical apparatus.

It is claimed for this wire that while the black enameled insulation is only .0002 inches to .0004 inches in thickness, it is so elastic that when the wire is stretched to the breaking point, the enameled insulation does not break until the wire itself gives way. It will withstand the ordinary atmospheric corrosives and the severe atmospheric conditions of shops, factories, tropical climates and the sea coast indefinitely. It is not injured by indefinite exposure to temperatures of 250 degrees Fahrenheit, a temperature which will destroy the tensile strength of cotton or silk in a few hours. It cannot be removed from the wire by the ordinary solvents, and the wire can be handled as easily and successfully as a silk insulated wire.

Black enameled wire was given a four year's trial in the manufacture of the Western Electric Company's own apparatus before it was offered to the open market.

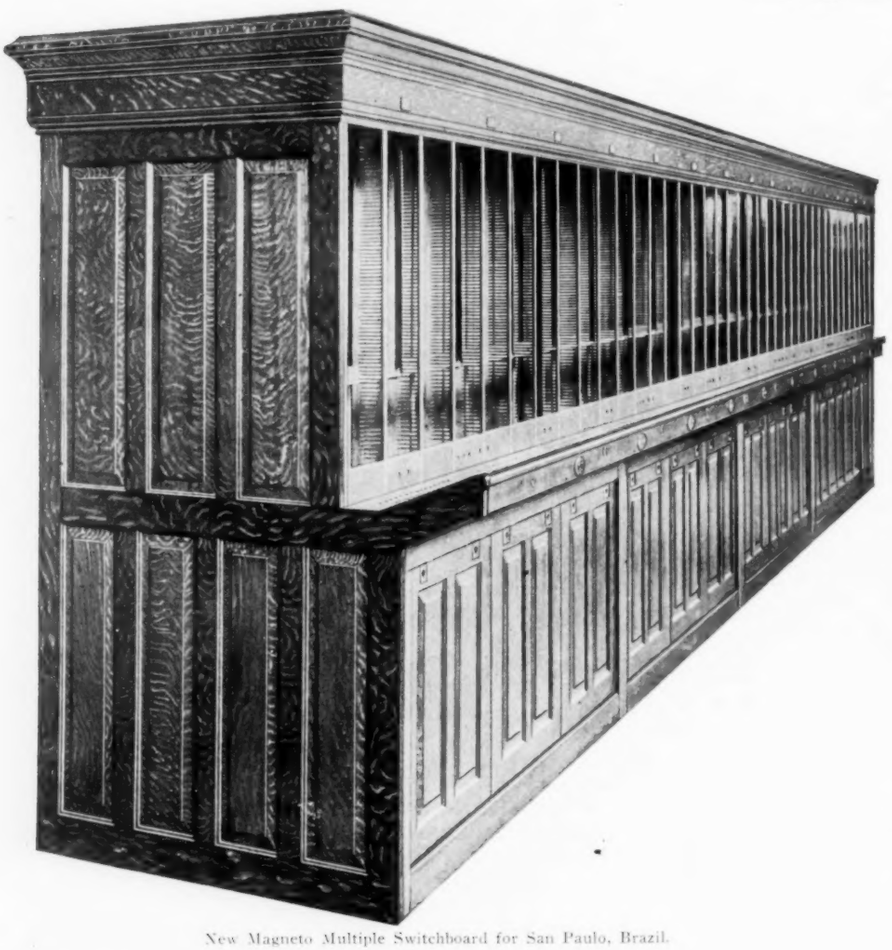
One of the great advantages possessed by black enameled wire is its small diameter as compared with that of single silk or cotton insulated wire. The winding space (for a specified number of turns) saved by black enameled wire over single silk No. 34 B. & S. wire is 25 per cent.

Non-multiple Toll Switchboards

The Western Electric Company has just issued bulletin No. 1006, describing non-multiple toll switchboards. The apparatus presented in this bulletin is

for use as toll boards in either magneto or central battery exchanges. They are for use also as magneto exchange switchboards where a desk type board is desired or a switchboard with a lower key-shelf than is ordinarily provided on local boards.

The boards described in this publication are divided into two general types, those having self-restored line signals, and those with manually restored line signals. Considerable space is devoted to the combined jacks and signals used with the first type of boards. The bulletin, which contains thirty-six pages, is illustrated with many photographs and diagrams and contains a table showing the capacity of standard types of non-multiple toll switchboards.



New Magneto Multiple Switchboard for San Paulo, Brazil.

New Magneto Multiple Switchboard for Chihuahua, Mexico.

Kellogg Boards for Latin-America

Among the many common battery exchange systems installed recently by the Kellogg Switchboard & Supply Company, the 11-section 10,000-line capacity exchange for San Paulo, Brazil is of special interest on account of its size and importance. This contract was closed by J. C. Murray, sales engineer in the Kellogg employ.

This system is to be used first as a magneto multiple lamp signal switchboard, but is so designed that it may be changed to a common battery system without discarding any of the original apparatus. The present equipment is 4,960 lines. The handsome, massive quartered-oak board, illustrated herewith from photograph taken just previous to packing, will be equipped for 31 operators' positions, each to have 15 universal cords with ring back keys.

The Kellogg company has furnished complete accessory apparatus, including intermediate distributing frame, terminal clips for 4,960 lines on answering and multiple side. The relay frame is for 5,400 subscribers' lines. The Kellogg main distributing frame is equipped with 4,960 Kellogg arresters and terminal clips for 6,250 outside lines. There is to be one two-position chief operator's desk and one one-position wire chief's desk.

The complete operating plant will be made up as follows: One set of 11 cuts storage battery; two motor generator changing sets operated from 220 volts; 60-cycles; three-phase alternating current. Two ringing machines with howler attachment, one to operate from the battery and the other to operate from the primary battery circuit. One white Italian marble power board.

As stated, the system is sent out as a magneto multiple lamp signal exchange, but is so designed that it may be gradually

changed to a common battery system without discarding any of the original apparatus. A slight change in the wiring at the relay rack is all that is necessary to convert a magneto line to a common battery line. The cord circuits as furnished are of the universal type and will automatically adapt themselves to line conditions.

Another interesting installation of the Kellogg Company is for the city of Chihuahua, Mexico, is a complete exchange with an ultimate capacity of 1,600 magneto multiple lines.

The present equipment will be 800 lines, combined drops and jacks. There will be three sections, five operators, each equipped with 15 double lamp supervision cord circuits with ring back keys, single party. There will be a one-position combination chief and toll desk, equipped for ten toll lines and one wire chief's turret equipment complete. One main distributing frame, equipped with 800 arresters and terminal clips for 1,350 outside lines. The power plant will be furnished complete as follows: Two sets of 11 cells each storage battery, one motor generator charging set and power board.

Vice-Consul-General Edward Bell, Cairo, states that the telephone service of Egypt is not a state monopoly, but the sanction of the minister of public works is required for the erection of all telephone lines, except such as are erected by the state telegraph department. The public service is provided by either the state telegraph department or by the Telephone Company of Egypt (Limited).

The Telephone Company of Egypt (Limited) is the only private company operating in Egypt. It serves the public in the following cities: Cairo, Alexandria, Port Said, Tanta, Mansoura, Suez, Zagazig, Fayoum, Assiut, Beni-Suef, and Mina—that is to say, all the principal cities. The total number of the company's stations now in operation in Egypt is 12,512, including those for the service of the ministry of the interior in the different provinces, and the wire mileage is 52,242 miles.

Western Electric Wins Honors

Efficient telephone apparatus developed along American lines has come into general use throughout the exchanges of Europe. This is largely due to the efforts of European houses of the Western Electric Company, notable among which is the Bell Telephone Manufacturing Company of Antwerp, Belgium. This company was recently awarded the Grand Prix for its exhibit in the class of electrical apparatus and appliances at the International Exposition recently held at Brussels, Belgium.

The Bell Telephone Manufacturing Company is the pioneer telephone manufacturer of Belgium, having entered the field only six years after the invention of the telephone. At the exposition this company occupied a large space in the Belgium section, being located next to the exhibit of the telegraph and telephone department of the Belgium government, whose requirements it has filled from the beginning. The exhibit, a photograph of which is shown on this page, included many types of apparatus manufactured at the Antwerp factory. Among these were telephone sets of many descriptions, small type switchboards, as well as a large common battery exchange in complete working order with its necessary power plant, frames and racks. Other apparatus required for making up a complete installation of a telephone exchange was shown.

The Belgian minister of war received from an officer of his staff detailed for that purpose a report on the section of the exposition reserved for the Belgian electrical industry. This report stated with reference to the exhibit of the Bell Telephone Manufacturing Company: "It is marvelous from a mechanical point of view and of most excellent construction." During the course of his official visit the Belgian minister of public works also warmly congratulated the company on its exhibit.

Belgium was one of the first countries in Europe to establish public telephone service. When the Bell Telephone Manufacturing Company was formed in 1882 as a branch of the Western Electric Company it was capitalized at 1,000,000 francs. At that time about one hundred workmen were employed in the factory established in the Vieille Chaussee. This building was destroyed by fire the same year. In 1883 a new factory was built in the Rue Boudewyns. The business of the company increased rapidly and it was soon necessary to enlarge the building and to purchase ground for additions. Today a group of large buildings are used to house the shops and offices. The original force of workmen has been doubled and redoubled many times.

This is one of the best examples of the spread of American influence into the manufacturing field of Europe.

Catalogue No. 31 of the Swedish-American Telephone Company illustrates and describes practically every kind of apparatus, tool and supply used by telephone companies, and should be in the hands of every telephone man.

Western Electric Exhibit at Brussels Exposition.

The Value and Use of Telephone Bulletins

Telephone development is advancing so rapidly that only by careful application and systematic reading can the telephone engineer, manager and operator keep abreast of the times. New books on telephony make their appearance frequently, but because new apparatus is developed more frequently than new books can be printed, about the only way telephone men can obtain information regarding new apparatus is through the trade press and the bulletins which are published by manufacturers describing new equipment.

The more progressive manufacturers issue bulletins describing their new developments just as soon as such apparatus is ready for the market. These bulletins, which contain valuable descriptive information and diagarms of circuits, are usually profusely illustrated. The information is helpful to the manager, wire chief and installer; in fact, to everyone actually engaged in the telephone business. Although these bulletins deal with technical subjects they are generally written in a semi-technical style and can be easily understood by anyone. Bulletins on nearly every subject, ranging from power plant equipment to telephone sets, can be obtained.

Take switchboard apparatus for example: Separate bulletins have been prepared on magneto, central battery, toll and switchboard, each containing detailed descriptions of all the circuits and apparatus.

"Central Battery Telephone Sets and Accessories" is the subject of a bulletin in which all central battery exchange operators are interested. It tells all about the design and construction of wall and desk sets, gives information on accessories, and, in addition, describes code, two-party, selective and harmonic ringing systems.

Those interested in magneto equipment will find the bulletin on "Magneto Telephone Sets and Accessories" the most valuable of all, as it gives in addition to a description of the construction and design of the sets themselves, information as to just what sets should be used in every class of service. It also describes the various ringing systems in use and the latest developments in accessory apparatus.

Another interesting bulletin is one entitled: "Accessories and Protector Equipment." This bulletin describes aerial, open wire and underground cable construction; the proper apparatus for protecting lines from power circuits and lightning; various types of distributing frames, and cable racks. Much of this information cannot be obtained from any other source. Those interested in power plant equipment will find a bulletin on this subject instructive and valuable. In it is described the latest developments in power switchboards; controlling apparatus; charging apparatus, such as mercury arc rectifiers and motor generators; interrupters, ringing machines, harmonic ringing apparatus and general information on storage batteries and battery cabinets.

When it is considered what a gold mine of information these bulletins are, it is not hard to understand why telephone men wish to be notified when new bulletins are published and in this way secure the latest information on the developments in this field. Most telephone men, of course, keep a file of telephone

Western Electric
TELEPHONE POWER PLANT EQUIPMENTS
CENTRAL BATTERY NON-MULTIPLE SWITCHBOARDS WITH CAMP SIGNALS
ACCESSORIES AND PROTECTIVE EQUIPMENT FOR NON-MULTIPLE SWITCHBOARDS
TELEPHONES AND SIGNALING APPARATUS FOR MINES
MAGNETO NON-MULTIPLE SWITCHBOARDS
MAGNETO NON-MULTIPLE SWITCHBOARDS NO. 1000 SELECTIVE UNIT TYPE
BRANCH EXCHANGE SWITCHBOARDS
CENTRAL BATTERY TELEPHONE SETS AND ACCESSORIES
MAGNETO TELEPHONE SETS AND ACCESSORIES
Interphone SYSTEMS

Some Bulletins Issued by the Western Electric Company.

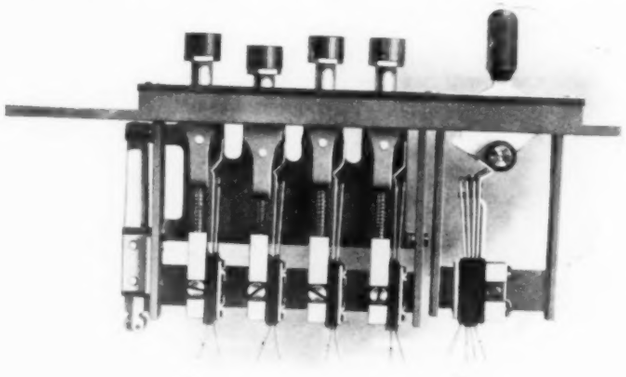
bulletins and just as soon as a new bulletin is issued by a manufacturing company, read it, and then put it on file for future reference. This keeps them posted as to the new developments and improvements being made, and, in addition, provides a reliable reference library. There are some, however, who have not seen the advantages of reading and filing these bulletins, probably because they have not realized their value.

The accompanying illustration shows some of the bulletins now being distributed by a prominent manufacturer and serve as an indication of what is available. Any of these bulletins can be obtained by writing the manufacturer, and telephone men should see to it that they not only obtain such bulletins but that in addition they are placed on the mailing list of the manufacturing company, which will send them, free of charge, new bulletins as soon as they are issued.

Something New in Four-Party Keys

A new type of key designed especially for harmonic ringing and embodying many new features of merit, as well as many features now found in the same company's horizontal type of key now so extensively used, has been placed on the market by the Western Electric Company.

This key, known as the No. 468 type, is of the locking-indicating type. After ringing the subscriber, the button remains in an intermediate position between



No. 468.—Type Four-Party Key for Harmonic Ringing.

fully depressed and normal, thus indicating the last party rung.

The key has a heavy cast brass frame covered with a rubber escutcheon, which mounts flush with the key-shelf. Machine screws are used to fasten the key to the iron framework of the key-shelf.

A distinctive feature is the fact that each group of springs is mounted as a unit. All units are alike and, therefore, interchangable. They may be removed by simply taking out one screw. In this type of key there is only one pair of talking contacts. The plungers are of the roller type and noiseless in operation.

Central Battery Telephone Sets and Accessories

Bulletin No. 1117, describing central battery wall and desk sets, together with their accessories, for meeting standard requirements, has just been issued by the Western Electric Company. This is a companion to bulletin No. 1116, issued a short time ago, on standard magneto sets and accessories. This bulletin describes and illustrates central battery telephone sets to meet every condition of service, except where special treatment is needed. For these special cases, such as for mines, railways, etc., separate bulletins have been issued describing especially designed apparatus.

The newest bulletin contains thirty-two pages and is illustrated by many photographs and diagrams. A number of pages are devoted to a description of the design and construction of standard central battery wall and desk sets. Signaling systems are described under the heads of code ringing, two-party selective, harmonic selective, four-party selective and four-party semi-selective ringing systems. Telephone sets for various sorts of conditions are listed with their code numbers.

Under the heading of accessories the bulletin lists and describes at length backboards, batteries, battery boxes, battery gages, binding posts, buzzers, coin collectors, condensers, cords, desk set boxes, desk stands, flexiphones, flexiphone arms, gongs, gong mountings, hand sets, hand set handles, induction coils, number plates, telephone protectors, protector blocks, fuses, micas and mountings, receivers, relays, ringers, switchhooks, test sets, transmitters, transmitter arms and brackets.

American Electric Telephone Co. in Receivership

The American Electric Telephone Company has filed a voluntary petition in bankruptcy. The following statement has been issued over the signature of the company's president, P. C. Burns:

On account of past due interest on debentures which were placed by the American Electric Telephone Company about eleven years ago, when the telephone manufacturing business was very prosperous, receivership proceedings were threatened by eastern parties, and in order to conserve the interests of all, a petition was filed by the company for a receiver. The receiver will operate the property as before with a view of a reorganization.

The sale of many large operating plants to the Bell company so reduced the demand for central energy apparatus as to practically destroy the once great value in our patents, tools and organization used in central energy work. The competition in the telephone manufacturing business is very severe, caused largely by public service corporations, directly or indirectly, not only selling all kinds of supplies and apparatus to their own systems, but selling to our customers as well.

The American Electric Telephone Company has paid in full all its merchandise creditors, does not owe a dollar to any bank, and aside from a few small creditors, all moneys due are owing to the bond holders and P. C. Burns.

The receiver is now, or the reorganization when effected, will continue supplying a full line of telephones, switchboards and general telephone supplies. I trust the friends of the American Electric Telephone Company will continue to give it all the assistance in their power.

The Western Electric Company's Year

The Western Electric Company has this year changed its fiscal year to end December 31, instead of November 30.

For the thirteen months ending December 31, 1910, its sales were approximately $66,000,000 as compared with $45,000,000 for the twelve months of the previous year.

These sales for 1910 compare with $69,000,000 for the year 1906, which was the largest year in the history of the company.

The increase over the past year has been well distributed over the various lines of merchandise which the company handles, such as telephones, cable,

motors, generators and electric light supplies, and the increase in the business has been well distributed throughout the United States.

The company during the past year has continued its policy of concentrating the manufacturing at Hawthorne, and several millions of dollars have been spent there in new buildings.

The latter part of 1910 more new buildings, to cost $1,000,000, have been authorized, which will still further increase the capacity of the plant. The company now employs altogether upwards of 24,000 men.

New French Telephone Publication

A new quarterly publication relating to the postal service, telegraphs and telephones, has recently appeared in France. It is entitled *Annales des Postes, Télégraphes, et Téléphones*, annual subscription price six francs in France, seven francs in foreign countries. The editor is A. Dumas, 6 Rue de la Chaussée-d'Antin, Paris. The first number of the publication comprises about 130 pages of reading matter compiled from various French and foreign documents concerning the technical and commercial problems of the postal, telegraph and telephone industries. The articles are in the nature of short reviews, and seem to cover every phase of the subject.

The publication enjoys the favor and patronage of the French Ministry of Public Works.

Telephones in British Guiana.

Consul Arthur J. Clare, Georgetown, says the telephone system of British Guiana is owned and controlled by the local government. It is under the post-office department, and is in charge of the government electrician in Georgetown. The magneto type of telephone is used, and these together with other electrical apparatus are imported from England, the switchboard in use being imported from Belgium.

There are about 500 telephones in use in Georgetown, and about 60 in New Amsterdam. Approximately 50 new ones are imported annually. The number of subscribers increased from 439 in 1908 to 562 in 1909.

The charge per annum for mercantile premises, according to the amount of the trade license, is from $18 to $36; for other business premises, $18; for offices and boarding houses, $24; and for private residences, $12.

The Kinloch Telephone Company has won a suit instituted by the Western Electric Company. The Kinloch obtains the privilege of certain devices in controversy. The contest had cost both parties more than $80,000, and it was believed that an understanding would be more economical and practical than litigation. Vice President H. Linton Reber, of the Kinloch, said the Western Electric consented not only to withdraw the suit, but to give the Kinloch licenses to use all the devices during the life of the patents.

A bill to give the Minnesota Railroad and Warehouse Commission power to regulate telephone lines, including their rates and service, was introduced in the senate by John J. Moonan, of Waseca. It compels telephone companies to connect with the lines of other companies wherever this would give improved service. A similar bill was introduced two years ago, and fought by the telephone companies.

The Hoyt Electrical Instrument Works has found it advisable to close the sales office maintained at 161 Summer street, Boston, Mass., and the company's customers are advised that their communications will receive attention if sent either to the New York office, 136 Liberty street, or to the factory at Peacook, N. H., whichever they may find to be the most convenient.

A large folder being distributed by the Stromberg-Carlson Telephone Manufacturing Company calls attention to the real necessity for mine telephones, and shows types of the company's Mine-a-Phone apparatus. An attached mailing card permits the interested reader to order mine apparatus with the least possible waste of time.

A card issued by W. U. Matthews & Brother calls attention to the Matthews "telafault," and states that one of the larger Bell companies has in use over sixty of these instruments. It is claimed that one trouble man located the lightning crosses in a 240-pair cable within a fraction of an inch, and cleared them in half a day.

Consul General John P. Bray, of Sydney, reports that the federal post department of the government of the Australian commonwealth, controlling telephone matters, has announced its intention of calling for proposals, in the near future, for at least one automatic telephone installation similar to those now in use in certain cities of the United States.

The Ericsson Manufacturing Company is sending out to the trade a very attractive four-leaf folder, printed in black on red and white, describing the Ericsson "everlasting" steel telephones. The folder includes a mailing card addressed to the company for further information.

Willard S. Mears, who has been for some months a member of the sales force of the Stromberg-Carlson Telephone Manufacturing Company, is preparing to handle the marketing of that concern's "Hear-A-Phone," which will be placed on sale within the next month.

Besides the bill to give one telephone company the right to obtain the property of another by condemnation there will be a bill introduced in the Wisconsin legislature making it compulsory for rival toll telephone companies to furnish connections to each other over their lines.

The McRoy Clay Works has a noteworthy exhibit of underground clay conduits at section B, space 45, Northwestern Electric Show, National Gerard Armory, Minneapolis, Minn. The show closes February 4.

The Monarch Electric and Wire Company has moved into its fine new quarters at the northeast corner of Adams and Desplaines streets, Chicago.

Brevities of the Business

PERSONAL NOTES.

Joseph W. Stickney, for six years superintendent of the eastern Indiana district of the Central Union Telephone Company, at Anderson, Ind., has been made commercial superintendent of the company with headquarters at Indianapolis. Mr. Stickney will be succeeded at Anderson by Charles Nesbit, special agent for Mr. Stickney. J. Lloyd Wayne, division equipment foreman of the company at Indianapolis, has been appointed traffic superintendent and W. R. Hirst, formerly manager at Anderson, has been appointed plant superintendent.

Edward U. Albrecht, for the past two years manager of the Bureau County Telephone Company's exchange at Sheffield, Ill., has been promoted to the position of auditor and will be transferred to the general office of the company at Princeton. Mr. Albrecht will be succeeded at Sheffield by Carl Nelson.

P. H. Irwin, formerly division superintendent of the Rocky Mountain Bell Telephone Company at Salt Lake City, recently died in San Antonio, Tex., of tuberculosis. On account of ill health Mr. Irwin went to El Paso, Tex., where he became superintendent of the Tri-State Telegraph and Telephone Company.

Dr. J. F. Demers, general manager of the National Telephone Company, and president of the Canadian Telephone Association, recently died at his home in Levis, Quebec, after an eight days' illness of typhoid fever. Dr. Demers was well known in telephone circles.

E. L. Greenleaf, president of the Illinois Telephone Company, died at his home in Jacksonville on January 10th at the age of seventy-two.

W. M. Cox, general foreman of the New York Telephone Company in Schenectady, has resigned to accept a more lucrative position with the Southern New England Telephone Company, with headquarters at New Haven, Conn. Mr. Cox will be succeeded by Chester Teagarden, of Toledo, Ohio.

A. Shepard has been appointed manager of the Cumberland Telephone Company at Natchitoches, La.

Harry H. Angevine has been appointed local manager of the New York Telephone Company at Brockport and assumed his position on January 1.

N. C. Kingsbury, local representative of the N. W. Harris bond interests in Chicago, has been appointed vice-president of the American Telegraph and Telephone Company, with headquarters in New York.

F. H. Bethel, of Philadelphia, vice-president of the Bell Telephone Company of Pennsylvania and its controlling companies, has been appointed vice-president of the New York Telephone Company.

Philip L. Spaulding, of Philadelphia, has been appointed second vice-president and general manager of the Bell Telephone Company of Pennsylvania, the Chesapeake and Potomac Telephone Company, The Delaware and Atlantic Telegraph and Telephone Company, and the Diamond State Telephone Company. Mr. Spaulding will have charge of the commercial, engineering, plant, traffic, supply and right of way departments under the direction of the vice-president, F. H. Bethel.

L. K. Webb, formerly manager of the Cumberland Telephone Company's exchange at Knoxville, has taken charge of the company's plant at Louisville, succeeding W. K. Boardman, who has been transferred to the superintendency of the Nashville district.

Henry E. Allen, a well known telephone man of Dayton, has been promoted to the position of division commercial superintendent of the Central Union Telephone Company with headquarters in that city. Mr. Allen began as an operator at Cuyahoga Falls in 1887 and later became manager of the Bell exchanges at Ashtabula, Mansfield, Canton and Akron. In 1895 he assumed the management of the Dayton exchange. In 1901 he became district manager and in 1904 district superintendent for southwestern Ohio.

J. B. Douglas, general manager of the Central Union Telephone Company at Dayton, will become manager of the commercial department of Dayton.

Professor Dugald C. Jackson, of the Massachusetts Institute of Technology, president of the American Institute of Electrical Engineers, and member of the firm of D. C. and Wm. B. Jackson, of Chicago, has been selected by the British government as an adviser in the matter of the valuation of the extensive telephone system which the government will this year purchase and make a part of the national post office organization. Mr. Jackson is now in England, but will return to the United States early in February. Owing to the fact that no other foreign engineers have been consulted by the British government, this commission is a striking tribute to the prominence not only of American electrical engineers in the telephone field, but to Prof. Jackson and his firm personally.

Edward W. Leaning, 230 Livingston ave., Albany, N. Y., has been appointed assistant chief of the Division of Statistics and Accounts by the Public Service Commission, at a salary of $2,400. Mr. Leaning has been connected with the Delaware and Hudson Company for a number of years.

The Public Service Commission, Second District, has appointed Miss A. J. Conneely, of Jamestown, and Miss Lillian A. Vavasour, of Albany, as telephone traffic inspectors. Both of these young women have had wide experience in telephone work, commencing as exchange operators, graduating to the position of chief operators, and because of exceptional ability and merit, have been employed by the companies as traveling chief operators. It will be the duty of these inspectors to visit the operating rooms of the various companies within the jurisdiction of the commission, offering suggestions or corrections and make a report of their investigations to the commission in order that it may follow up and if necessary issue an order enforcing an improvement in operating practices and methods. It is expected this method will tend toward giving more uniform practice and generally improve the telephone system throughout the state.

A. J. Rosenberger, eastern representative of the Monarch Telephone Manufacturing Company, with headquarters in Philadelphia, was in Chicago for a few days recently and called at the office of TELEPHONE ENGINEER.

George J. Liver, formerly sales manager for the Metropolitan Electric Supply Company, Chicago, is now with Otto Reiman, 234 Madison street.

A. C. Sands of Tacoma, for years district manager of the Pacific Telephone and Telegraph Company, recently died in Seattle. Mr. Sands came to Tacoma in 1884, and in June of that year assumed the management of the local telephone office, which then had twenty-five subscribers. At the time of his resignation the number had reached 11,000.

A. F. Adams, Joplin, Mo., has been appointed general manager of the Home Telephone Company of St. Joseph. Mr. Adams also fills the position of representative to Theodore Gary, president of the company.

A. V. Keyes, formerly manager of the Oroville exchange of the Pacific States Telephone and Telegraph Company, has accepted the position of special agent for the company with headquarters at Chico.

W. J. Stadelman, for the past six months manager of the Santa Monica Bay Home Telephone Company at Santa Monica, Cal., recently resigned. He was succeeded by L. R. Weaver, formerly of Richmond, Ind.

CONVENTIONS.

The annual meeting of the Wisconsin State Telephone Association will be held at Madison, February 1 and 2. Exhibits will be made in connection with the convention.

The National Independent Telephone Association has postponed its annual convention until February 8, 9 and 10.

NEW TELEPHONE COMPANIES.

CAMDEN, ARK.—The Rice Belt Telephone Company has been chartered with a capital stock of $60,000. The incorporators are W. B. Ritchie, B. C. Powell and B. C. Blain.

KERMAN, CAL.—The Vineland Telephone Company is the name of a new concern which has been incorporated with a capital stock of $25,000 for the purpose of operating a telephone system in Kerman and vicinity. The incorporators are J. C. Ashlin, R. S. Elliott, P. H. Carlsgard and others.

SAN FRANCISCO, CAL.—The Poulsen Wireless Company has been incorporated under the laws of Arizona by San Francisco capitalists. The capital stock of the company is $25,000,000 and its purpose is to exploit the wireless tele-

graph and telephone patents of Valdemar Poulsen, Copenhagen, in the United States. Among those interested are the following: Beach Thompson, president of the company, E. W. Hopkins, George A. Pope, Howard P. Veeder and other prominent California capitalists.

CORCORAN, CAL.—Articles of incorporation have been filed for the Alpaugh Telephone and Telegraph Company; capital stock $5,000.

NEW ATHENS, ILL.—The Valley View Telephone Company has been incorporated for the purpose of operating a rural telephone line. The incorporators are Charles Dinges, Henry Becker and Otto Dinges; capital stock $240.

ANTIOCH, ILL.—Articles of incorporation have been filed for the Antioch Telephone Company with a capital stock of $2,500. The incorporators are Wallace E. Drom, Charles E. Richards and James R. Cribb.

WAWAKA, IND.—The People's Mutual Telephone Company of Wawaka has been incorporated by John Reidenbach, Braden Franks, William Weaver, B. D. Cook and G. O. Steinberger, with a capital stock of $2,500.

CRYSTAL, IND.—The Columbia Telephone Company of Dubois county has been incorporated by Ogan Thacker, A. W. Cane and George W. Beaty.

HENRYVILLE, IND.—In protest against the alleged excessive rates of the Cumberland Telephone Company, leading business men of Henryville have organized a new telephone company. The officers are as follows: President, George Bellinger; vice-president, M. F. Kirkpatrick; secretary, S. B. Elrod; treasurer, Henry Schell.

INDIANAPOLIS, IND.—The Interstate Telephone Company recently incorporated with a capital stock of $75,000, has been formed to acquire and operate the existing telephone lines now operating in Daviess and Greene counties under the name of the Interstate Telephone System, including exchanges at Odon, Elnora, Montgomery, Epsom and Scotland. It is the purpose of the new company to extend and improve the system. The incorporators are: Oscar E. Pottorff, K. P. Knight, J. G. Paul, and Elizabeth A. Coulter, all of this city. The principal office will be Room 503, K. of P. building.

WINCHESTER, IND.—The Farmers' Telephone Company is the name of a new organization which has been incorporated by former patrons of the Eastern Indiana Telephone Company who are opposed to a proposed increase in rates from $1.00 to $1.25 per month. The capital stock is $10,000 and the incorporators are as follows: Clarence Mullen, Leander Moorman, Omer Vanlandingham, Olynthus Cox and David Lesley.

CENTER, IND.—The Center Telephone Company has been incorporated with a capital stock of $10,000. The directors are John Ingels, W. H. McReynolds and Elmer Thomas.

ALLERTON, IOWA.—The Allerton Telephone Company has been incorporated with a capital stock of $10,000. The incorporators are R. B. McCoy, W. H. Davis, J. H. Jaques, L. Porter, A. S. Myers, W. T. Grimes, E. P. Philips.

ELKADER, IOWA.—Articles of incorporation have been filed for the Boardman-Wagner Telephone Company; capital stock $1,600.

DURANGO, IOWA.—The Rose Valley Telephone Company has been incorporated with James M. Dunn, president, and J. H. Denkhoff, secretary.

WAVERLY, IOWA.—H. O. Steeger, John J. Becker, Herman Brandt, W. C. Steeger, F. H. Meyer and A. F. Sauerbrel are the incorporators of the Washington Rural Telephone Company. The capital stock is $6,000.

FAYETTE, IOWA.—The Stony Hill Telephone Company has been incorporated by Dan Brause, E. C. Margraff and David Saltsgiver with a capital stock of $10,000.

SHILOH, KY.—The Shiloh Telephone Company has been incorporated. The capital stock is $500 and the incorporators are T. M. Ross, J. N. Ragsdale, and J. H. Clark.

NEW CONCORD, KY.—J. T. Burton, W. H. Curd and J. T. Mitchell are the incorporators of the Blood River Telephone Company. The capital stock is placed at $700.

FULLERTON, KY.—The Fullerton Home Telephone Company is the name of a new company incorporated by John Arthur, J. R. Shepard, Mary Fullerton and Lyman Warnock with a capital stock of $1,200.

OGDEN CENTER, MICH.—The Ogden Mutual Telephone Company has been granted a charter for 30 years by the secretary of state. The capital stock is $5,000. The incorporators are C. E. Arnold, Ira Ashley, B. W. Baker and others.

CADILLAC, MICH.—The Armstrong Telephone Company has been organized with the following officers: President, T. C. Colley; vice-president, C. R. Huffman; secretary and treasurer, Floyd Ayers.

FRIBERG, MINN.—The Edwards Telephone Company has been organized with the following officers: President, August Splitsberger; vice-president, Chas. Marquardt; treasurer, Casper O. Nelson; secretary, E. M. Nelson. It is the purpose of the company to operate a telephone system in Friberg and the adjoining country.

MACHENS, MO.—The Machens West Alton Telephone Company has been incorporated with a capital stock of $10,000. The incorporators are: Wm. Machens, Andrew Machens, of Machens; Henry Bastean and G. R. Pennington, of West Alton, and William Pike, of Portage. The incorporators are also the directors of the company.

ORCHARD FARM, MO.—The Orchard Farm Telephone Company has been incorporated with a capital stock of $2,000 by Gustave Kipp, William Schnedler and Ernest Nolte.

LORETTO, NEB.—The Akron-Loretto Telephone Company has been incorporated; capital stock $3,500.

FINESVILLE, N. J.—The Delaware Union Telephone Company of New Jersey, is the name of a new organization incorporated by Edward Hager, Edgar Frey and Samuel Lippincott with a capital stock of $100,000.

PERSIA, N. Y.—The Zoar Telephone Company has been incorporated with a capital stock of $1,250. The following are the directors: Lyman W. Shipman, Albert A. Galasslen, of Gowanda, and Edward C. Mugridge, of Collins Center.

YADKINVILLE, N. C.—The Secretary of State has issued a charter to the Yadkinville Telephone Company. The capital stock of the company is $6,000 and the incorporators are W. F. Swain and others.

GREENFIELD, OHIO.—The Greenfield Telephone Company has been incorporated with a capital stock of $10,000 by Stanley Pike and others.

LEXINGTON, OKLA.—Articles of incorporation have been filed by E. N. Abernathy and R. P. Wynee, of Lexington; J. L. Abernathy, of Purcell, and W. F. Wiley, of Oklahoma City, for the Good Service Telephone Company. The capital stock is $15,000.

ASTORIA, OREG.—The Nehalem Valley Telephone Company will be organized with a capital stock of $3,000 for the purpose of constructing a line from Astoria to Elsie, via Jewell, which will serve the owners of large timber tracts in that section. David Tweedle and James Jamison are the proprietors of the enterprise.

ROWLANDS, PA.—The Lackawaxen and Milford Telephone Company was recently incorporated with a capitalization of $5,000.

WASHINGTON, PA.—A certificate of incorporation has been issued to the Isherwood Chandelier and Manufacturing Company which will engage in the manufacture of fixtures, motors, fans, chandeliers, telephones, etc. The capital stock is $10,000 and the main office is at Birmingham. The officers are as follows: President, W. S. Isherwood; vice-president, L. W. Isherwood; secretary, George L. Smith; treasurer, W. M. Isherwood.

CLARK, S. D.—The Day-Merton Telephone Company has been incorporated with a capital stock of $20,000.

OENAVILLE, TEX.—The Oenaville Rural Telephone Company of Bell county was recently incorporated by T. P. Aycock, W. S. Elliott and W. T. Wright with a capital stock of $1,000.

KYLE, TEX.—The Kyle Telephone Company has been organized to take over the system recently installed in this place by G. T. Howe. The officers are as follows: President, C. F. Heidenreich; vice-president, G. G. Johnson; treasurer, P. Allen; secretary, L. C. Schlemmer; manager, H. P. Kelley. The capital stock is $5,000 and the company will at once make application for a charter. The company begins business with a new plant, a large list of subscribers and everything indicates a prosperous business.

PE ELL, WASH.—The Farmers' Telephone Company of Pe Ell has been organized.

CORNELL, WASH.—The Enterprise Telephone Company was recently organized.

ELK CREEK, WIS.—Articles of incorporation have been filed for the Elk Creek Telephone Company by W. A. Warner, Luke Roskos and A. M. Thompson; capital stock $8,000.

FREMONT, WIS.—The Fremont Telephone Company is the name of a new organization incorporated by George H. Dobbins, W. E. Sherburne and W. J. A. McIntyre, to install a telephone system in Fremont and surrounding country.

MISHICOT, WIS.—The Mishicot Telephone Company has

been incorporated by A. Holst, August Rhode, P. Boniller and others with a capital stock of $2,600.

CONSTRUCTION NEWS.

FLORENCE, ALA.—Through its district manager, F. L. Woodruff, the Southern Bell Telephone and Telegraph Company has submitted a contract to the city council for the installation of a common-battery system in Florence, the same to be completed by the close of the present year. The matter has been referred to a special committee for consideration.

SAVANNA, ILL.—The Carroll County Independent Telephone Company, through the vote of its directors, decided to spend $29,000 for the improvement of its system in this city, which will include the erection of a new building, a new central energy switchboard and other equipment.

VALLEY JUNCTION, IOWA.—The Iowa Telephone Company will install a new exchange in this place with a capacity of 500.

MARSHALLTOWN, IOWA.—At a meeting of the directors of the Merchants', Mechanics' and Farmers' Telephone Company it was decided to erect a new office and exchange building. The company hopes to be able to begin its building about March 1. An automatic telephone system will be installed.

GRAND ISLAND, NEB.—The Nebraska Telephone Company has plans for extensive improvements in this part of the state during the present year. The past year the company spent approximately two million dollars in improvements in the state and the present plans contemplate an equal expenditure this year.

ATLANTIC CITY, N. J.—The Coast Line Telephone Company will spend $60,000 in extending its service. Its present capacity is 3,600 which will be increased to 5,000.

NEWARK, N. Y.—At a recent meeting of the Wayne Telephone Company it was voted to spend $55,000 during the present year in improving the company's service in the county, including cables, outside lines and new inside equipment for exchanges.

LIMA, OHIO.—The Lake Erie and Western Railroad now uses the telephone in dispatching its trains between this city and Findlay and the system will be extended to the entire Sandusky division.

CANONSBURG, PA.—A new underground central energy telephone system will be installed in this city during the present year at an estimated cost of $75,000 to $100,000.

APPLETON, WIS.—The Wisconsin Telephone Company will erect a new exchange building in this city.

FINANCIAL ITEMS.

MONTICELLO, ILL.—The capital stock of the Platt County Telephone Company has been increased from $10,000 to $50,000.

CROSS PLAINS, IND.—The Farmers' Mutual Telephone Company, J. W. Stevenson, president, has filed an amendment to its charter increasing its capital stock from $900 to $10,000.

LONDON, KY.—The capital stock of the London Telephone Company has been increased from $6,000 to $8,000. The company will make some important improvements.

SCOTTSVILLE, KY.—The Settle and Gainesville Telephone Company has increased its capital stock from $7,500 to $17,500.

POOLESVILLE, MD.—The Poolesville Telephone Company will increase its capital stock from $2,500 to $5,000.

MILES CITY, MONT.—The Miles City and Ekalaka Telephone Company has filed with the secretary of state notice of increase in capital stock from $6,000 to $25,000 in order that it may extend and improve its service.

BUXTON, N. D.—At the annual meeting of the Red River Valley Telephone Company it was voted to increase the capital stock from $100,000 to $200,000 for the purpose of extending its toll lines. The following officers were elected: President, M. F. Hagge, Hatton; vice-president, Iver Thompson, Sherbrooke; secretary and treasurer, J. G. Odegard, Northwood; superintendent, C. H. Tolan. The company reported 2,300 patrons and paid 12 per cent dividend on its old stock, besides keeping $3,150 for the reserve fund.

ANDOVER, OHIO.—The Andover Electric Telephone Company has increased its capital stock from $6,000 to $25,000.

ASHLAND, OHIO.—The capital stock of the Star Telephone Company has been increased from $100,000 to $150,000.

IRONTON, OHIO.—For the purpose of taking over the plant of the Bell Telephone Company in Andover, the Home Telephone Company has increased its capital stock from $50,000 to $120,000.

DILL, OKLA.—The Dill Farmers' Telephone Company has filed notice with the secretary of state of increase of capital stock from $1,000 to $5,000. The directors of the company are John Cresswell, H. C. Castleberry, J. J. Haws, W. S. Petty and W. O. Leperton.

FILLMORE, UTAH.—The Millard County Telephone and Telegraph Company has filed an amendment to its charter increasing its capital stock from $6,000 to $50,000.

NEWPORT, VT.—At a hearing before the public service commission the Passunsic Telephone Company was given permission to increase its capital stock.

FRANCHISES ASKED AND GRANTED.

ROSEVILLE, CAL.—The Roseville Home Telephone Company has applied to the board of trustees for a franchise to install a local telephone system.

OSBORNE, KAN.—The Osborne-Cheyenne Telephone Company has been granted a franchise by the city council.

OWOSSO, MICH.—The Union Telephone Company of Alma will ask the city council for a new franchise in this city. The present franchise does not expire for a number of years, but the company desires to increase its present rates and the old charter will not permit of this. The rate at present is $18 for residence and $24 for business telephones and it is proposed to increase the same 25 per cent. The company contemplates a large number of improvements in case the raise in rates is accomplished.

HETTINGER, N. D.—The Hettinger and Cedar River Telephone Company has been granted a franchise to operate telephone lines in the county.

DELL ROY, OHIO.—The Bergholtz Telephone Company, recently incorporated, has been granted a franchise to install and operate a telephone system in this place.

TACOMA, WASH.—The Equality Telephone Company has been granted permission by the Board of County Commissioners to construct and operate telephone lines in the county which will connect with the Sunset telephone lines. The trustees of the new company are George W. Edwards, A. A. Hook, W. H. Pierce, Ivan Atkinson and W. H. Wilson.

RATES.

RICHMOND, IND.—The Home Telephone Company is considering increase of its rates to $21 a year for residenc and $30 a year for business telephones. The company claims it has not been making a fair dividend on its investment, and cannot so long as the present rates are maintained; also that now having 3,100 subscribers it has the right, under its franchise with the city, to increase its rates twenty-five cents a month.

JEFFERSONVILLE, IND.—The proposed increase of rates by the Cumberland Telephone Company in this city from $1.50 to $2.00 a month is meeting with opposition and an independent company will probably be granted a franchise.

PORTLAND, IND.—The city council has directed the filing of an injunction suit to prevent the Home Telephone Company from increasing its rates 25 cents per month, making the price $2.25 for business houses and $1.25 for residences.

FAIRFIELD, IOWA.—Beginning with the first of the year the Jefferson County Telephone Company, which practically covers Jefferson county, increased its rates from $1.50 to $2.00 for business and from $1.00 to $1.50 for residence telephones, while country telephones and those on party lines retain the same rate of $1.00. The company has 1,600 instruments.

CROWLEY, LA.—By order of the Railroad Commission, effective January 1st, the rate for business telephones was reduced from $3.50 to $2.75 per month and residence telephones from $2.00 to $1.65.

OWOSSO, MICH.—Beginning January 1st the Union Telephone Company increased its rates on rural telephones in Shiawassee county from $12 to $15 per year. The patrons object and propose to organize a company of their own.

SPRINGFIELD, MO.—At a special session of the city council the franchise of the Ozark Telephone Company was reduced from 25 to 11 years and the rates placed at $21 per year for residence telephones and $36 for business telephones.

LINCOLN, NEB.—The State Railway Commission has denied the application of the Plattsmouth Telephone Company to increase its toll rates.

ALBION, N. Y.—The Wayne Telephone Company has announced that beginning with February 1st it will increase the

rates of its subscribers in Newark and other Wayne county villages about 33 1-3 per cent for dwellings and a higher rate for business houses. The Albion system was acquired by the Wayne Telephone Company in August last and since that time the service has been greatly improved. The purpose is to make the rates uniform throughout.

Lowville, N. Y.—J. J. Domser, manager of the Black River Telephone Company has announced that after February 1st the rates will be $36 for business telephones, $21 for residence, one-party line; $18 for two-party line and $15 for four-party line.

Pittsburg, Pa.—W. B. Clarkson, division manager of the Central District and Printing Telegraph Company, announces that beginning April 1, a new schedule of rates will be established within a new district to be known as the Greater Pittsburg district which will be a reduction from the present rates. The new rates will include Pittsburg, Bellevue, Braddock, Carrick, Crafton, Homestead, Millvale, Mount Lebanon, Sharpsburg, Knoxville, Mount Oliver, McKees Rocks, West View and Wilkinsburg.

Binghamton, N. Y.—The American Union Telephone Company, formerly the York State Telephone Company, has decided to increase its rates to $25, $48 and $36 for business houses and $18, $24 and $30 for residences.

Waco, Tex.—The Home Telephone Company through its general manager, J. B. Earle, has petitioned the mayor and commissioners for permission to increase its rates and to this end asks for an amendment to its franchise allowing the company to make charge for its service on a graduated scale, same to be based on the size of the plant and number of subscribers served.

Sun Prairie, Wis.—The State Railroad Commission has granted the Interurban Telephone Company operating in this city, Waterloo and Lake Mills, permission to increase its rates about 20 per cent, which will bring its annual receipts up to $15,100.

MISCELLANEOUS.

Phoenix, Ariz.—Dr. J. W. Foss, president of the Overland Telephone Company, announces the purchase of the Buckeye and Arlington telephone lines which have been connected with the company's long distance service. The growth of the Overland company since it commenced business in Phoenix in September last has been phenomenal. During that time fourteen hundred instruments have been connected in that city and there are four hundred contracts wating to be filled. Equipment thought sufficient for two years has been outgrown and orders have been placed for $25,000 worth of new apparatus.

Shelbyville, Ill.—Definite steps are being taken for the consolidation of the Shelby County Telephone Company and the Queen City and Shelby County Mutual Telephone Company and a meeting of the stockholders has been called for February 6th to vote on the proposition.

Carlyle, Ill.—The Citizens' Telephone and Telegraph Company of Clinton county has been purchased by H. J. C. Beckemeyer at a consideration of $34,000 on a yearly installment plan. The new directors of the company are T. E. Ford, Fred Schafly, James J. Gray, Ferd Krebs and H. J. C. Beckemeyer.

Hazelton, Ind.—The Hazelton Telephone system has been purchased by J. F. Brithaupt, secretary and manager of the White River Valley Telephone Company, of Decker, Ind., and J. D. Doty, of Olney, Ill. The plant will be under the management of Mr. Doty.

Oakland City, Ind.—The Oakland City Telephone Company has been purchased by Fred Parrott and George Shouse, of Princeton, and Richard Ready and Harry Davis of Decker. The plant will be under the management of Mr. Shouse, formerly wire chief at Princeton.

Greensburg, Ind.—The Central Union and Decatur County Telephone companies have reached a conclusion whereby they will consolidate. The Central Union will withdraw from the local field but will receive all long distance messages. The exchange will be moved into new quarters and an automatic switchboard will be installed.

Center, Ind.—The Center telephone system, owned and operated by L. W. Hercules, has been taken over by the Center Telephone Company, that concern having purchased the property and all rights connected therewith from Mr. Hercules. The officers of the new company are as follows: President, John Ingels; secretary, Elmer Thomas; treasurer, William Smith.

Independence, Iowa.—It is stated that after April 1st the two telephone exchanges will be consolidated, the Corn Belt Company having purchased the interests of the Iowa Telephone Company in this place.

Red Oak, Iowa.—The Montgomery Telephone Company at this place has been purchased by the Iowa Telephone Company and if the majority of the subscribers so decide the two systems will be consolidated.

Emporia, Kan.—A meeting of the Kansas Mutual Telephone Association was recently held in this city for the purpose of adopting plans for changes effecting mutual telephone companies which the legislature will be asked to make during its present session. J. B. Shields of Lost Springs is president of the association.

Muskegon, Mich.—At a meeting of the directors of the United Home Telephone Company of Ludington and the Independent Telephone Company of this city, it was practically decided to combine the two companies, the new concern, which will be capitalized at $500,000, taking in all independent lines in western Michigan as far north as Manistee.

Kansas City, Mo.—The Missouri and Kansas Telephone Company paid into the city treasury $2,311.96, the same being 2 per cent of its gross earnings for the year 1910. In addition the company furnishes the city with fifteen free telephones.

Auburn, Neb.—The Johnson Telephone Exchange has been purchased by the Auburn Telephone Company which now owns all in the county with the exception of the exchanges at Peru and Julian.

North Platte, Neb.—The North Platte Telephone Company operating exchanges at North Platte, Big Springs, Brule, Keystone and Ogalalla, including over 1,000 telephones, has been purchased by the Nebraska Telephone Company for a consideration of $100,000. Eben D. Warner who was manager of the company will retain his present position for the time being, and will develop the $40,000 immediate improvements contemplated by the purchasers. The Nebraska Telephone Company was represented by G. E. McFarland, G. H. Pratt and L. B. Wilson and the North Platte Company by E. M. F. Leflang, Eben D. Warner and Alf. E. Grantham.

Omaha, Neb.—Judge Munger recently granted the Independent Telephone Company permission to issue additional receiver's certificates in the amount of $115,000.

Fullerton, Neb.—The Fullerton Telephone Company, owned and operated by T. M. Sheaf & Sons, has been purchased by the Nebraska Telephone Company, the consideration being $17,000. Arthur Sheaf will act as secretary and commercial manager, and C. E. Hobbs, electrician, will be retained as superintendent of construction and equipment. The Nebraska Company was represented in the deal by Guy H. Pratt, commercial superintendent, and A. A. Lowman, plant superintendent, of Omaha, and R. Y. Hyde, district plant chief, of Fremont.

Newark, N. Y.—The telephone business of Wayne county, which has been divided between the New York Telephone Company, the Wayne-Monroe Telephone Company and the Wayne County Telephone Company, has been consolidated into one service under the Wayne Telephone Company, recently organized, and of which H. P. McDonough is vice-president and general manager. By this consolidation many duplications have been abolished.

Ardmore, Okla.—Beginning with January 1st the management of the Chickasaw Telephone Company was taken over by the Pioneer Telephone and Telegraph Company of Oklahoma City. The Pioneer Company has owned a large share of the company's stock for a number of years, and in order to extend and improve the Chickasaw plant the company decided to take direct charge of the work. The local management of the company will remain as before.

Eaton, Ohio.—At a recent meeting of the West Manchester and Eldorado Home Telephone Company the following officers were elected: President, Frank M. Davisson; vice-president, R. G. Howell; secretary, John Gilfillan; treasurer, J. Warren Leas; superintendent, William Arens.

Salem, Oreg.—During the present session of the legislature a bill will be introduced by Representative Edward G. Amme of Multnomah, compelling telephone companies to connect with the local exchanges of all cities and towns in which they enter with their long distance lines.

Paupac, Pa.—The Wayne aand Pike Telephone Company, the Wallen-Paupac Company and the Wayne and Lackawanna Telephone Company have merged and will be operated under the name of the Paupac Telephone Company, capitalized at $50,000.